

01-24-00

A

Practitioner's Docket No.

B1000

PATENT

Preliminary Classification:

Proposed Class:

Subclass:

NOTE: "All applicants are requested to include a preliminary classification on newly filed patent applications. The preliminary classification, preferably class and subclass designations, should be identified in the upper right-hand corner of the letter of transmittal accompanying the application papers, for example 'Proposed Class 2, subclass 129.'" M.P.E.P. § 601, 7th ed.

 jc530 U.S. PTO
 09/489876
 01/20/00

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Box Patent Application
 Assistant Commissioner for Patents
 Washington, D.C. 20231

NEW APPLICATION TRANSMITTAL

Transmitted herewith for filing is the patent application of

Inventor(s): Richard A. Bishel

WARNING: 37 C.F.R. § 1.41(a)(1) points out:

"(a) A patent is applied for in the name or names of the actual inventor or inventors.

"(1) The inventorship of a nonprovisional application is that inventorship set forth in the oath or declaration as prescribed by § 1.63, except as provided for in § 1.53(d)(4) and § 1.63(d). If an oath or declaration as prescribed by § 1.63 is not filed during the pendency of a nonprovisional application, the inventorship is that inventorship set forth in the application papers filed pursuant to § 1.53(b), unless a petition under this paragraph accompanied by the fee set forth in § 1.17(f) is filed supplying or changing the name or names of the inventor or inventors."

For (title):

Micro computer-Controlled AC Power Switch Controller
and DC Power Supply Method and Apparatus

CERTIFICATION UNDER 37 C.F.R. § 1.10*

(Express Mail label number is mandatory.)

(Express Mail certification is optional.)

I hereby certify that this New Application Transmittal and the documents referred to as attached therein are being deposited with the United States Postal Service on this date 1/20/00 in an envelope as "Express Mail Post Office to Addressee," mailing Label Number EK438446805US, addressed to the: Assistant Commissioner for Patents, Washington, D.C. 20231.

EK438446805US

Richard A. Bishel

(type or print name of person mailing paper)

Richard Bishel

Signature of person mailing paper

WARNING: Certificate of mailing (first class) or facsimile transmission procedures of 37 C.F.R. § 1.8 cannot be used to obtain a date of mailing or transmission for this correspondence.

WARNING: Each paper or fee filed by "Express Mail" must have the number of the "Express Mail" mailing label placed thereon prior to mailing. 37 C.F.R. § 1.10(b).

"Since the filing of correspondence under § 1.10 without the Express Mail mailing label thereon is an oversight that can be avoided by the exercise of reasonable care, requests for waiver of this requirement will not be granted on petition." Notice of Oct. 24, 1996, 60 Fed. Reg. 55,439, at 58,442.

(New Application Transmittal [4-1]—page 1 of 11)

 jc714 U.S. PTO
 01/20/00

09489876-012000

1. Type of Application

This new application is for a(n)

(check one applicable item below)

- ☒ Original (nonprovisional)
☐ Design
☐ Plant

WARNING: Do not use this transmittal for a completion in the U.S. of an International Application under 35 U.S.C. § 371(c)(4), unless the International Application is being filed as a divisional, continuation or continuation-in-part application.

WARNING: Do not use this transmittal for the filing of a provisional application.

NOTE: If one of the following 3 items apply, then complete and attach ADDED PAGES FOR NEW APPLICATION TRANSMITTAL WHERE BENEFIT OF A PRIOR U.S. APPLICATION CLAIMED and a NOTIFICATION IN PARENT APPLICATION OF THE FILING OF THIS CONTINUATION APPLICATION.

- ☐ Divisional.
- ☐ Continuation.
- ☒ Continuation-in-part (C-I-P).

2. Benefit of Prior U.S. Application(s) (35 U.S.C. §§ 119(e), 120, or 121)

NOTE: A nonprovisional application may claim an invention disclosed in one or more prior filed copending nonprovisional applications or copending international applications designating the United States of America. In order for a nonprovisional application to claim the benefit of a prior filed copending nonprovisional application or copending international application designating the United States of America, each prior application must name as an inventor at least one inventor named in the later filed nonprovisional application and disclose the named inventor's invention claimed in at least one claim of the later filed nonprovisional application in the manner provided by the first paragraph of 35 U.S.C. § 112. Each prior application must also be:

- (i) An international application entitled to a filing date in accordance with PCT Article 11 and designating the United States of America; or
- (ii) Complete as set forth in § 1.51(b); or
- (iii) Entitled to a filing date as set forth in § 1.53(b) or § 1.53(d) and include the basic filing fee set forth in § 1.16; or
- (iv) Entitled to a filing date as set forth in § 1.53(b) and have paid therein the processing and retention fee set forth in § 1.21(f) within the time period set forth in § 1.53(f).

37 C.F.R. § 1.78(a)(1).

NOTE: If the new application being transmitted is a divisional, continuation or a continuation-in-part of a parent case, or where the parent case is an International Application which designated the U.S., or benefit of a prior provisional application is claimed, then check the following item and complete and attach ADDED PAGES FOR NEW APPLICATION TRANSMITTAL WHERE BENEFIT OF PRIOR U.S. APPLICATION(S) CLAIMED.

WARNING: If an application claims the benefit of the filing date of an earlier filed application under 35 U.S.C. §§ 120, 121 or 365(c), the 20-year term of that application will be based upon the filing date of the earliest U.S. application that the application makes reference to under 35 U.S.C. §§ 120, 121 or 365(c). (35 U.S.C. § 154(a)(2) does not take into account, for the determination of the patent term, any application on which priority is claimed under 35 U.S.C. §§ 119, 365(a) or 365(b).) For a c-o-p application, applicant should review whether any claim in the patent that will issue is supported by an earlier application and, if not, the applicant should consider canceling the reference to the earlier filed application. The term of a patent is not based on a claim-by-claim approach. See Notice of April 14, 1995, 60 Fed. Reg. 20,195, at 20,205.

(New Application Transmitted [4-1]—page 2 of 11)

WARNING: When the last day of pendency of a provisional application falls on a Saturday, Sunday, or Federal holiday within the District of Columbia, any nonprovisional application claiming benefit of the provisional application must be filed prior to the Saturday, Sunday, or Federal holiday within the District of Columbia. See 37 C.F.R. § 1.78(a)(3).

- ☐ The new application being transmitted claims the benefit of prior U.S. application(s). Enclosed are ADDED PAGES FOR NEW APPLICATION TRANSMITTAL WHERE BENEFIT OF PRIOR U.S. APPLICATION(S) CLAIMED.

3. Papers Enclosed

A. Required for filing date under 37 C.F.R. § 1.53(b) (Regular) or 37 C.F.R. § 1.153 (Design) Application

22 Pages of specification

5 Pages of claims

17 Sheets of drawing

WARNING: DO NOT submit original drawings. A high quality copy of the drawings should be supplied when filing a patent application. The drawings that are submitted to the Office must be on strong, white, smooth, and non-shiny paper and meet the standards according to § 1.84. If corrections to the drawings are necessary, they should be made to the original drawing and a high-quality copy of the corrected original drawing then submitted to the Office. Only one copy is required or desired. For comments on proposed then-new 37 C.F.R. § 1.84, see Notice of March 9, 1998 (1990 O.G. 57-62).

NOTE: "Identifying indicia, if provided, should include the application number or the title of the invention, inventor's name, docket number (if any), and the name and telephone number of a person to call if the Office is unable to match the drawings to the proper application. This information should be placed on the back of each sheet of drawing a minimum distance of 1.5 cm. (5/8 inch) down from the top of the page . . ." 37 C.F.R. § 1.84(c).

(complete the following, if applicable)

- ☐ The enclosed drawing(s) are photograph(s), and there is also attached a "PETITION TO ACCEPT PHOTOGRAPH(S) AS DRAWING(S)." 37 C.F.R. § 1.84(b).

☐ formal

☒ informal

B. Other Papers Enclosed

7 Pages of declaration and power of attorney

1 Pages of abstract

7 Other

4. Additional papers enclosed

☐ Amendment to claims

☐ Cancel in this applications claims _____ before calculating the filing fee. (At least one original independent claim must be retained for filing purposes.)

☐ Add the claims shown on the attached amendment. (Claims added have been numbered consecutively following the highest numbered original claims.)

☐ Preliminary Amendment

☐ Information Disclosure Statement (37 C.F.R. § 1.98)

☐ Form PTO-1449 (PTO/SB/08A and 08B)

☐ Citations

(New Application Transmittal [4-1]—page 3 of 11)

000000-9266460

- ☐ Declaration of Biological Deposit
- ☐ Submission of "Sequence Listing," computer readable copy and/or amendment pertaining thereto for biotechnology invention containing nucleotide and/or amino acid sequence.
- ☐ Authorization of Attorney(s) to Accept and Follow Instructions from Representative
- ☐ Special Comments
- ☒ Other

5. Declaration or oath (Including power of attorney)

NOTE: A newly executed declaration is not required in a continuation or divisional application provided that the prior nonprovisional application contained a declaration as required, the application being filed is by all or fewer than all the inventors named in the prior application, there is no new matter in the application being filed, and a copy of the executed declaration filed in the prior application (showing the signature or an indication thereon that it was signed) is submitted. The copy must be accompanied by a statement requesting deletion of the names of person(s) who are not inventors of the application being filed. If the declaration in the prior application was filed under § 1.47, then a copy of that declaration must be filed accompanied by a copy of the decision granting § 1.47 status or, if a nonsigning person under § 1.47 has subsequently joined in a prior application, then a copy of the subsequently executed declaration must be filed. See 37 C.F.R. §§ 1.63(d)(1)-(3).

NOTE: A declaration filed to complete an application must be executed, identify the specification to which it is directed, identify each inventor by full name including family name and at least one given name, without abbreviation together with any other given name or initial, and the residence, post office address and country or citizenship of each inventor, and state whether the inventor is a sole or joint inventor. 37 C.F.R. § 1.63(a)(1)-(4).

☒ Enclosed
Executed by

(check all applicable boxes)

- ☒ Inventor(s).
- ☐ legal representative of inventor(s).
37 C.F.R. §§ 1.42 or 1.43.
- ☐ joint inventor or person showing a proprietary interest on behalf of inventor who refused to sign or cannot be reached.
- ☐ This is the petition required by 37 C.F.R. § 1.47 and the statement required by 37 C.F.R. § 1.47 is also attached. See item 13 below for fee.

☐ Not Enclosed.

NOTE: Where the filing is a completion in the U.S. of an International Application or where the completion of the U.S. application contains subject matter in addition to the International Application, the application may be treated as a continuation or continuation-in-part, as the case may be, utilizing ADDED PAGE FOR NEW APPLICATION TRANSMITTAL WHERE BENEFIT OF PRIOR U.S. APPLICATION CLAIMED.

- ☐ Application is made by a person authorized under 37 C.F.R. § 1.41(c) on behalf of all the above named inventor(s).

(The declaration or oath, along with the surcharge required by 37 C.F.R. § 1.16(e) can be filed subsequently).

- ☐ Showing that the filing is authorized.
(not required unless called into question. 37 C.F.R. § 1.41(d))

(New Application Transmittal [4-1]—page 4 of 11)

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WARNING: If the named inventors are each not the inventors of all the claims an explanation, including the ownership of the various claims at the time the last claimed invention was made, should be submitted.

~~X~~ The same.

or

- ☐ Not the same. An explanation, including the ownership of the various claims at the time the last claimed invention was made,
- ☐ is submitted.
- ☐ will be submitted.

NOTE: An application including a signed oath or declaration may be filed in a language other than English. An English translation of the non-English language application and the processing fee of \$130.00 required by 37 C.F.R. § 1.17(k) is required to be filed with the application, or within such time as may be set by the Office. 37 C.F.R. § 1.52(d).

- ☒ English
- ☐ Non-English
- ☐ The attached translation includes a statement that the translation is accurate. 37 C.F.R. § 1.52(d).

☐ An assignment of the invention to _____

- ☐ is attached. A separate ☐ "COVER SHEET FOR ASSIGNMENT (DOCUMENT) ACCOMPANYING NEW PATENT APPLICATION" or ☐ FORM PTO 1595 is also attached.
- ☐ will follow.

NOTE: "If an assignment is submitted with a new application, send two separate letters—one for the application and one for the assignment." Notice of May 4, 1990 (1114 O.G. 77-78).

WARNING: A newly executed "CERTIFICATE UNDER 37 C.F.R. § 3.73(b)" must be filed when a continuation-in-part application is filed by an assignee. Notice of April 30, 1993, 1150 O.G. 62-54.

(New Application Transmittal) [4-1]—page 5 of 11)

Certified copy(ies) of application(s)

Country	Appl. No.	Filed
Country	Appl. No.	Filed
Country	Appl. No.	Filed

☐ will follow.

NOTE: This item is for any foreign priority for which the application being filed directly relates. If any parent U.S. application or International Application from which this application claims benefit under 35 U.S.C. § 120 is itself entitled to priority from a prior foreign application, then complete item 18 on the ADDED PAGES FOR NEW APPLICATION TRANSMITTAL WHERE BENEFIT OF PRIOR U.S. APPLICATION(S) CLAIMED.

A. ☒ Regular application

CLAIMS AS FILED			
Number filed	Number Extra	Rate	Basic Fee 37 C.F.R. § 1.16(a) \$760.00
Total			
Claims (37 C.F.R. § 1.16(c))	6 - 20 = 0	× \$ 18.00	0
Independent			
Claims (37 C.F.R. § 1.16(b))	5 - 3 = 2	× \$ 78.00	156
Multiple dependent claim(s), if any (37 C.F.R. § 1.16(d))			
		+ \$260.00	0

- ☐ Amendment cancelling extra claims is enclosed.
- ☐ Amendment deleting multiple-dependencies is enclosed.
- ☐ Fee for extra claims is not being paid at this time.

NOTE: If the fees for extra claims are not paid on filing they must be paid or the claims cancelled by amendment, prior to the expiration of the time period set for response by the Patent and Trademark Office in any notice of fee deficiency. 37 C.F.R. § 1.16(d).

\$ 846

- B. ☐ Design application
(\$310.00—37 C.F.R. § 1.16(f))

\$_____

- C. ☐ Plant application
(\$480.00—37 C.F.R. § 1.16(g))

5 _____

11. Small Entity Statement(s)

- ☒ Statement(s) that this is a filing by a small entity under 37 C.F.R. § 1.9 and 1.27 is (are) attached.

WARNING: "Status as a small entity must be specifically established in each application or patent in which the status is available and desired. Status as a small entity in one application or patent does not affect any other application or patent, including applications or patents which are directly or indirectly dependent upon the application or patent in which the status has been established. The refiling of an application under § 1.53 as a continuation, division, or continuation-in-part (including a continued prosecution application under § 1.53(d)), or the filing of a reissue application requires a new determination as to continued entitlement to small entity status for the continuing or reissue application. A nonprovisional application claiming benefit under 35 U.S.C. § 119(e), 120, 121, or 365(c) of a prior application, or a reissue application may rely on a statement filed in the prior application or in the patent if the nonprovisional application or the reissue application includes a reference to the statement in the prior application or in the patent or includes a copy of the statement in the prior application or in the patent and status as a small entity is still proper and desired. The payment of the small entity basic statutory filing fee will be treated as such a reference for purposes of this section." 37 C.F.R. § 1.28(a)(2).

WARNING: "Small entity status must not be established when the person or persons signing the . . . statement can unequivocally make the required self-certification." M.P.E.P., § 509.03, 6th ed., rev. 2, July 1995 (emphasis added).

(complete the following, if applicable)

- ☐ Status as a small entity was claimed in prior application
 _____ / _____, filed on _____, from which benefit
 is being claimed for this application under:
 35 U.S.C. § ☐ 119(e),
 ☐ 120,
 ☐ 121,
 ☐ 365(c).

and which status as a small entity is still proper and desired.

- ☐ A copy of the statement in the prior application is included.

Filing Fee Calculation (50% of A, B or C above)

\$ 423

NOTE: Any excess of the full fee paid will be refunded if small entity status is established and a refund request are filed within 2 months of the date of timely payment of a full fee. The two-month period is not extendable under § 1.136, 37 C.F.R. § 1.28(a).

12. Request for International-Type Search (37 C.F.R. § 1.104(d))

(complete, if applicable)

- ☐ Please prepare an international-type search report for this application at the time when national examination on the merits takes place.

13. Fee Payment Being Made at This Time

☐ Not Enclosed☐ No filing fee is to be paid at this time.

(This and the surcharge required by 37 C.F.R. § 1.16(e) can be paid subsequently.)

☒ Enclosed☒ Filing fee\$ 423☐ Recording assignment

(\$40.00; 37 C.F.R. § 1.21(h))

(See attached "COVER SHEET FOR
ASSIGNMENT ACCOMPANYING NEW
APPLICATION".)

\$ _____

☐ Petition fee for filing by other than all the
inventors or person on behalf of the inventor
where inventor refused to sign or cannot be
reached

(\$130.00; 37 C.F.R. §§ 1.47 and 1.17(i))

\$ _____

☐ For processing an application with a
specification in

a non-English language

(\$130.00; 37 C.F.R. §§ 1.52(d) and 1.17(k))

\$ _____

☐ Processing and retention fee

(\$130.00; 37 C.F.R. §§ 1.53(d) and 1.21(i))

\$ _____

☐ Fee for international-type search report

(\$40.00; 37 C.F.R. § 1.21(e))

\$ _____

NOTE: 37 C.F.R. § 1.21(f) establishes a fee for processing and retaining any application that is abandoned for failing to complete the application pursuant to 37 C.F.R. § 1.53(f) and this, as well as the changes to 37 C.F.R. §§ 1.53 and 1.78(a)(1), indicate that in order to obtain the benefit of a prior U.S. application, either the basic filing fee must be paid, or the processing and retention fee of § 1.21(f) must be paid, within 1 year from notification under § 53(f).

Total fees enclosed

\$ ~~384~~ 423

14. Method of Payment of Fees

☒ Check in the amount of \$ ~~384~~ 423☐ Charge Account No. _____ in the amount of
\$ _____

A duplicate of this transmittal is attached.

NOTE: Fees should be itemized in such a manner that it is clear for which purpose the fees are paid. 37 C.F.R. § 1.22(b).

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15. Authorization to Charge Additional Fees

WARNING: If no fees are to be paid on filing, the following items should not be completed.

WARNING: Accurately count claims, especially multiple dependent claims, to avoid unexpected high charges, if extra claim charges are authorized.

- ☐ The Commissioner is hereby authorized to charge the following additional fees by this paper and during the entire pendency of this application to Account No. _____

☐ 37 C.F.R. § 1.18(a), (f) or (g) (filing fees)

☐ 37 C.F.R. § 1.16(b), (c) and (d) (presentation of extra claims)

NOTE: Because additional fees for excess or multiple dependent claims not paid on filing or on later presentation must only be paid or these claims cancelled by amendment prior to the expiration of the time period set for response by the PTO in any notice of fee deficiency (37 C.F.R. § 1.18(d)), it might be best not to authorize the PTO to charge additional claim fees, except possibly when dealing with amendments after final action.

☐ 37 C.F.R. § 1.18(e) (surcharge for filing the basic filing fee and/or declaration on a date later than the filing date of the application)

☐ 37 C.F.R. § 1.17(a)(1)-(5) (extension fees pursuant to § 1.136(a)).

☐ 37 C.F.R. § 1.17 (application processing fees)

NOTE: "... A written request may be submitted in an application that is an authorization to treat any concurrent or future reply, requiring a petition for an extension of time under this paragraph for its timely submission, as incorporating a petition for extension of time for the appropriate length of time. An authorization to charge all required fees, fees under § 1.17, or all required extension of time fees will be treated as a constructive petition for an extension of time in any concurrent or future reply requiring a petition for an extension of time under this paragraph for its timely submission. Submission of the fee set forth in § 1.17(a) will also be treated as a constructive petition for an extension of time in any concurrent reply requiring a petition for an extension of time under this paragraph for its timely submission." 37 C.F.R. § 1.136(a)(3).

☐ 37 C.F.R. § 1.18 (issue fee at or before mailing of Notice of Allowance, pursuant to 37 C.F.R. § 1.311(b))

NOTE: Where an authorization to charge the issue fee to a deposit account has been filed before the mailing of a Notice of Allowance, the issue fee will be automatically charged to the deposit account at the time of mailing the notice of allowance. 37 C.F.R. § 1.311(b).

NOTE: 37 C.F.R. § 1.28(b) requires "Notification of any change in status resulting in loss of entitlement to small entity status must be filed in the application . . . prior to paying, or at the time of paying, . . . the issue fee. . . ." From the wording of 37 C.F.R. § 1.28(b), (a) notification of change of status must be made even if the fee is paid as "other than a small entity" and (b) no notification is required if the change is to another small entity.

(New Application Transmittal [4-1]—page 9 of 11)

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☐ **Incorporation by reference of added pages**

(check the following item if the application in this transmittal claims the benefit of prior U.S. application(s) (including an international application entering the U.S. stage as a continuation, divisional or C-I-P application) and complete and attach the ADDED PAGES FOR NEW APPLICATION TRANSMITTAL WHERE BENEFIT OF PRIOR U.S. APPLICATION(S) CLAIMED)

- ☐ Plus Added Pages for New Application Transmittal Where Benefit of Prior U.S. Application(s) Claimed

Number of pages added _____

- ☐ Plus Added Pages for Papers Referred to in Item 4 Above

Number of pages added _____

- ☐ Plus added pages deleting names of inventor(s) named in prior application(s) who is/are no longer inventor(s) of the subject matter claimed in this application.

Number of pages added _____

- ☐ Plus "Assignment Cover Letter Accompanying New Application"

Number of pages added _____

☐ **Statement Where No Further Pages Added**

(if no further pages form a part of this Transmittal, then end this Transmittal with this page and check the following item)

- ☐ This transmittal ends with this page.

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Practitioner's Docket No. B1000

PATENT

ADDED PAGES FOR APPLICATION TRANSMITTAL WHERE BENEFIT OF
PRIOR U.S. APPLICATION(S) CLAIMED

NOTE: See 37 C.F.R. § 1.78.

17. Relate Back

WARNING: If an application claims the benefit of the filing date of an earlier filed application under 35 U.S.C. §§ 120, 121 or 365(c), the 20-year term of that application will be based upon the filing date of the earliest U.S. application that the application makes reference to under 35 U.S.C. §§ 120, 121 or 365(c). (35 U.S.C. § 154(e)(2) does not take into account, for the determination of the patent term, any application on which priority is claimed under 35 U.S.C. §§ 119, 365(a) or 365(b).) For a c-i-p application, applicant should review whether any claim in the patent that will issue is supported by an earlier application and, if not, the applicant should consider canceling the reference to the earlier filed application. The term of a patent is not based on a claim-by-claim approach. See Notice of April 14, 1995, 60 Fed. Reg. 20,195, at 20,205.

(complete the following, if applicable)

- ☐ Amend the specification by inserting, before the first line, the following sentence:

A. 35 U.S.C. § 119(e)

NOTE: "Any nonprovisional application claiming the benefit of one or more prior filed copending provisional applications must contain or be amended to contain in the first sentence of the specification following the title a reference to each such prior provisional application, identifying it as a provisional application, and including the provisional application number (consisting of series code and serial number)." 37 C.F.R. § 1.78(e)(4).

- ☐ "This application claims the benefit of U.S. Provisional Application(s) No(s).:

APPLICATION NO(S):

FILING DATE

_____/_____
_____/_____
_____/_____

_____"
_____"
_____"

(Added Pages for Application Transmittal Where Benefit of Prior U.S. Application(s) Claimed
(4-1.1)—page 1 of 5)

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B. 35 U.S.C. §§ 120, 121 and 365(c)

NOTE: "Except for a continued prosecution application filed under § 1.53(d), any nonprovisional application claiming the benefit of one or more prior filed copending nonprovisional applications or international applications designating the United States of America must contain or be amended to contain in the first sentence of the specification following the title a reference to each such prior application, identifying it by application number (consisting of the series code and serial number) or international application number and international filing date and indicating the relationship of the applications. . . . Cross-references to other related applications may be made when appropriate." (See § 1.14(a), 37 C.F.R. § 1.78(a)(2)).

- ☒ This application is a
- ☐ continuation
 - ☒ continuation-in-part
 - ☐ divisional

of copending application(s)

- ☒ application number 09 / 251, 233 filed on 1/16/99 *
☐ International Application _____ filed on _____

_____ and which designated the U.S."

NOTE: The proper reference to a prior filed PCT application that entered the U.S. national phase is the U.S. serial number and the filing date of the PCT application that designated the U.S.

NOTE: (1) Where the application being transmitted adds subject matter to the International Application, then the filing can be as a continuation-in-part or (2) if it is desired to do so for other reasons then the filing can be as a continuation.

NOTE: The deadline for entering the national phase in the U.S. for an international application was clarified in the Notice of April 28, 1987 (1079 O.G. 32 to 46) as follows:

"The Patent and Trademark Office considers the international application to be pending until the 22nd month from the priority date if the United States has been designated and no Demand for International Preliminary Examination has been filed prior to the expiration of the 19th month from the priority date and until the 32nd month from the priority date if a Demand for International Preliminary Examination which elected the United States of America has been filed prior to the expiration of the 19th month from the priority date, provided that a copy of the international application has been communicated to the Patent and Trademark Office within the 20 or 30 month period respectively. If a copy of the international application has not been communicated to the Patent and Trademark Office within the 20 or 30 month period respectively, the international application becomes abandoned as to the United States 20 or 30 months from the priority date respectively. These periods have been placed in the rules as paragraph (h) of § 1.494 and paragraph (i) of § 1.495. A continuing application under 35 U.S.C. 365(c) and 120 may be filed anytime during the pendency of the international application."

- ☐ "The nonprovisional application designated above, namely application _____ / _____, filed _____, claims the benefit of U.S. Provisional Application(s) No(s).:

APPLICATION NO(S).:

FILING DATE

_____ / _____	_____ "
_____ / _____	_____ "
_____ / _____	_____ "

- ☐ Where more than one reference is made above, please combine all references into one sentence.

(Added Pages for Application Transmittal Where Benefit of Prior U.S. Application(s) Claimed [4-1.1]—page 2 of 5)

* Which is based on Application
 S. N. 08/358,338, now issued as U.S. Patent
 5,872,832.

000000-92222460

The prior U.S. application(s), including any prior international Application designating the U.S., identified above in item 17B, in turn itself claim(s) foreign priority(ies) as follows:

The certified copy(ies) has (have)

- ☐ been filed on _____, in prior application 0 / _____, which was filed on _____.
- ☐ Is (are) attached.

WARNING: The certified copy of the priority application that may have been communicated to the PTO by the International Bureau may not be relied on without any need to file a certified copy of the priority application in the continuing application. This is so because the certified copy of the priority application communicated by the International Bureau is placed in a folder and is not assigned a U.S. serial number unless the national stage is entered. Such folders are disposed of if the national stage is not entered. Therefore, such certified copies may not be available if needed later in the prosecution of a continuing application. An alternative would be to physically remove the priority documents from the folders and transfer them to the continuing application. The resources required to request transfer, retrieve the folders, make suitable record notations, transfer the certified copies, enter and make a record of such copies in the Continuing Application are substantial. Accordingly, the priority documents in folders of international applications that have not entered the national stage may not be relied on. Notice of April 28, 1987 (1079 O.G. 32 to 46).

NOTE: The PTO finds it useful if a copy of the petition filed in the prior application extending the term for response is filed with the papers constituting the filing of the continuation application. Notice of November 5, 1985 (1060 O.G. 27).

- A. ☒ Extension of time in prior application

(This item must be completed and the papers filed in the prior application,
if the period set in the prior application has run.)

- ☒ A petition, fee and response extends the term in the pending prior application until 1/20/00

- ☒ A copy of the petition filed in prior application is attached.

- B. ☐ Conditional Petition for Extension of Time in Prior Application**

(complete this item, if previous item not applicable)

- ☐ A conditional petition for extension of time is being filed in the pending prior application.
- ☐ A copy of the conditional petition filed in the prior application is attached.

20. Further Inventorship Statement Where Benefit of Prior Application(s) Claimed

(complete applicable item (a), (b) and/or (c) below)

- (a) ☐ This application discloses and claims only subject matter disclosed in the prior application whose particulars are set out above and the inventor(s) in this application are
- ☐ the same.
- ☐ less than those named in the prior application. It is requested that the following inventor(s) identified for the prior application be deleted:

(type name(s) of inventor(s) to be deleted)

- (b) ☐ This application discloses and claims additional disclosure by amendment and a new declaration or oath is being filed. With respect to the prior application, the inventor(s) in this application are
- ☐ the same.
- ☐ the following additional inventor(s) have been added:

(type name(s) of inventor(s) to be added)

- (c) The inventorship for all the claims in this application are
- ☐ the same.
- ☐ not the same. An explanation, including the ownership of the various claims at the time the last claimed invention was made
- ☐ is submitted.
- ☐ will be submitted.

21. Abandonment of Prior Application (if applicable)

- ☒ Please abandon the prior application at a time while the prior application is pending, or when the petition for extension of time or to revive in that application is granted, and when this application is granted a filing date, so as to make this application copending with said prior application.

NOTE: According to the Notice of May 13, 1983 (103, TMOG 6-7), the filing of a continuation or continuation-in-part application is a proper response with respect to a petition for extension of time or a petition to revive and should include the express abandonment of the prior application conditioned upon the granting of the petition and the granting of a filing date to the continuing application.

22. Petition for Suspension of Prosecution for the Time Necessary to File an Amendment

WARNING: "The claims of a new application may be finally rejected in the first Office action in those situations where (A) the new application is a continuing application of, or a substitute for, an earlier application, and (B) all the claims of the new application (1) are drawn to the same invention claimed in the earlier application, and (2) would have been properly finally rejected on the grounds of art of record in the next Office action if they had been entered in the earlier application." M.P.E.P., § 706.07(b), 7th ed.

NOTE: Where it is possible that the claims on file will give rise to a first action final for this continuation application and for some reason an amendment cannot be filed promptly (e.g., experimental data is being gathered) it may be desirable to file a petition for suspension of prosecution for the time necessary.

(check the next item, if applicable)

- ☐ There is provided herewith a Petition To Suspend Prosecution for the Time Necessary to File An Amendment (New Application Filed Concurrently)

23. Small Entity (37 C.F.R. § 1.28(a))

- ☐ Applicant has established small entity status by the filing of a statement in parent application /_____ on _____.
- ☐ A copy of the statement previously filed is included.

WARNING: See 37 C.F.R. § 1.28(a).

WARNING: "Small entity status must not be established when the person or persons signing the . . . statement can unequivocally make the required self-certification." M.P.E.P., § 509.03, 7th ed. (emphasis added).

24. NOTIFICATION IN PARENT APPLICATION OF THIS FILING

- ☐ A notification of the filing of this
(check one of the following)
- ☐ continuation
 - ☐ continuation-in-part
 - ☐ divisional

is being filed in the parent application, from which this application claims priority under 35 U.S.C. § 120.

(Added Pages for Application Transmittal Where Benefit of Prior U.S. Application(s) Claimed
[4-1.1]—page 5 of 5)

000000-92888460

Practitioner's Docket No. B1000

PATENT

- ☐ Applicant Bishel, Richard A ☐ Patentee _____
☐ Application No. _____ ☐ Patent No. _____
☐ Filed on _____ ☐ Issued on _____

Title: MicroComputer - Controlled AC Power Switch
Controller and DC Power Supply Method and Apparatus

**STATEMENT CLAIMING SMALL ENTITY STATUS
(37 CFR 1.9(f) and 1.27(b))—INDEPENDENT INVENTOR**

As a below named inventor, I hereby state that I qualify as an Independent Inventor, as defined in 37 CFR 1.9(c), for purposes of paying reduced fees to the United States Patent and Trademark Office under Sections 41(a) and (b) of Title 35, United States Code, to the Patent and Trademark Office, with regard to the invention described in

- ☒ the specification filed herewith, with title as listed above.
☐ the application identified above.
☐ the patent identified above.

I have not assigned, granted, conveyed or licensed, and am under no obligation under contract or law to assign, grant, convey or license, any rights in the invention to any person who would not qualify as an independent inventor under 37 CFR 1.9(c), if that person had made the invention, or to any concern that would not qualify as a small business concern under 37 CFR 1.9(d), or a nonprofit organization under 37 CFR 1.9(e).

Each person, concern or organization to which I have assigned, granted, conveyed, or licensed or am under an obligation under contract or law to assign, grant, convey, or license any rights in the invention is listed below:

- ☒ No such person, concern, or organization exists.
☐ Each such person, concern or organization is listed below.*

*NOTE. Separate statements are required from each named person, concern or organization having rights to the invention as to their status as small entities. (37 CFR 1.27)

FULL NAME _____
ADDRESS _____

☐ INDIVIDUAL ☐ SMALL BUSINESS CONCERN ☐ NONPROFIT ORGANIZATION

FULL NAME _____
ADDRESS _____

☐ INDIVIDUAL ☐ SMALL BUSINESS CONCERN ☐ NONPROFIT ORGANIZATION

FULL NAME _____
ADDRESS _____

☐ INDIVIDUAL ☐ SMALL BUSINESS CONCERN ☐ NONPROFIT ORGANIZATION

000000-92858460

(Small Entity—Independent Inventor [7-1]—page 2 of 2)

**MICROCOMPUTER-CONTROLLED AC POWER SWITCH CONTROLLER
AND DC POWER SUPPLY METHOD AND APPARATUS**

RELATED APPLICATIONS

5 This is a Continuation-In-Part Application of co-pending Application Serial
No. 09/251,233 filed February 16, 1999 which is a continuation of U.S. application
Serial No. 08/358,338, now issued as U.S. Patent No. 5,872,832.

FIELD OF THE INVENTION

10 This invention relates to AC electric current control systems, such as motor controllers
and illumination switches.

BACKGROUND OF THE INVENTION

15 The connection of AC power controllers with the wiring of buildings is usually
obtainable only with one side of the AC power line. For example, the wire for the
switch circuit from a ceiling or porch light is often connected with the hot side of the
AC circuit being the only line switched. Therefore, full line power is not available at
most wall switch locations. As a result of this wiring practice, it is necessary that any
electrical device intended to find popular acceptance as a replacement for a wall-
mounted switch must rely upon merely the power present in the one side of the circuit.
Such a device must be connected in series with the load and the AC power source.

Also, wall-mounted switch controllers which include dimmers, time-delay devices, emergency flashing devices, variable intensity controllers, and motor controllers are designed as dedicated devices that serve one function and usually are
5 designed where the full line power is available. If not available, then additional wiring is needed.

Weber in U.S. Pat. No. 4,300,090 and Dubot et al in U.S. Pat. No. 4,754, 213 disclose a technique to provide DC power supply by taking the pre-conduction potential which is developed across a thyristor. This potential is derived by fixing the
10 turn-on voltage by zener diodes. The AC power is rectified and filtered to provide low voltage direct current. This requires a thyristor to provide the voltage drop and another thyristor or relay to control the load device current.

Weber noted this deficiency in U.S. Pat. No. 4,878,010 where he uses a slightly different technique in which the thyristor is used for both deriving low voltage
15 DC power and also as the control device. In this patent, Weber derives the power from the zener drop during ON and OFF times to provide the low-voltage DC power. He controls the thyristor by allowing the zener current to the thyristor or diverts the current flow away from the gate of the thyristor to other side of the circuit using a shunting scheme. The turn-on potential of the gate along with the zener voltage sets
20 the low voltage DC power when the thyristor is ON and shunting transistor with the zener voltage sets the low voltage DC power when the thyristor is OFF.

Depending on the thyristor gate voltage, the low voltage DC will be at different levels for the control circuits. Also, Weber discloses in U.S. Pat. No. 4,878,010 a technique to provide AC power control using one side of the AC lines. His technique is limited to charging a capacitor every other half cycle, on only the positive-going AC cycles. Therefore, to maintain the necessary power for the complete cycle, Weber needs to use a much larger capacitor for the storage of the DC power than if one uses every half cycles of AC power. Furthermore, he needs to use thyristors that have sensitive gate control, which are more expensive than typical thyristors. In addition, Weber shows several dedicated configurations for each type of functions, which requires extensive hardware redesign for each function.

Other references shown have circuits which use a microcontroller, but derive their power from charging a large capacitor, batteries, transformers, or are designed to have both AC lines available. Here is the summary of the different schemes which have been proposed to provide power to the control circuitry:

In U.S. Patent No. 4,878,010, the device turns ON at a fixed voltage level and provides power during the time the load is powered. However, the device must use a very large capacitor because the device derives power every cycle, and uses a dedicated circuitry. Also, the fixed voltage level limits the usefulness of the device to ON and OFF operations.

In U.S. Patent No. 4,754,213, the device uses a thyristor and a large power relay in series. It fixes the ON voltage to a certain level, and uses a dedicated circuitry.

In U.S. Patent No. 4,924,109, the device use the same technique as 4,878,010 and allows for a 30-50% DIM operation.

In U.S. Patent No. 5,281,452, the device has a programmable controller, but derives power from a transformer which is connected to both leads of the AC source,
5 or from a battery when one lead is only available.

In U.S. Patent No. 5, 573,983, the device has a programmable controller, but has a dedicated power supply derived from both AC lines.

In U.S. Patent No. 4,733,182, the device requires two AC power lines for power.

10 In U.S. Patent No. 4,733,128, the device requires a two AC power lines which are coupled by a transformer to derive the DC power supply.

In U.S. Patent No. 4,649,323, the device has a microcontroller and a zero-crossing detector, but uses dedicated DC power supply which is derived from both AC power lines. It requires a choke to operate, and only the switches are wall-mounted.

15 In U.S. Patent No. 5,319,283, the device requires a large capacitor to keep power when the device provides power to the AC load. I t also requires two thyristors for controlling the switching operation.

In U.S. Patent No. 5,811,963, the device charges the large capacitor during the time when the AC load is not being provided power. During the time when the AC
20 load requires power, the device uses the DC power from the stored power in the capacitor. If the power is required continuously, this scheme is not effective.

5

- 5

Accordingly, there has heretofore existed a need for an inexpensive and effective system for providing an AC power controller who derives its power from series connection between the AC power source and AC load.

SUMMARY OF INVENTION

The present invention provides a highly versatile microcomputer-controlled switch operating in series with an AC circuit that is installed between an AC load such as a light fixture, and the source for the AC power. This versatile switch controller
5 derives DC power form the AC circuit, which is in series with the AC load and AC power, by stealing a small portion of the AC power every half cycle. This AC power is rectified for each half cycle and is used to maintain a small capacitor charge during the times when controller has turned ON power to the load.

In previous inventions, the capacitor needs to be large enough to maintain DC
10 power for a full cycle or more such as noted in Weber US Pat. No. 4,878,010 or required two thyristors such as US Pat. No. 4,745,213. In both these cases, '010 and '213, the AC voltage used was fixed based on the external connected zeners. The problem with these arrangements is that fixing the voltage where the thyristor turns ON limits the device to ON and OFF operations and does not lend itself to dimming
15 functionality. In this invention, by contrast, the amount of AC voltage can vary or be fixed depending on the microcontroller or circuitry. If one needs to dim the lights or slow down the motor, than the AC voltage would be switch ON at any portion of the AC cycle.

Since this design utilizes an isolation thyristor driver such as a relay or
20 optoisolator driver, the microcontroller can easily be programmed to turn the power to the AC load ON and OFF, similar to if one were to use a controller with a dedicated power supply.

The controller only needs to provide gate current pulse at the beginning of every half-cycle to enable the thyristor. Once the thyristor is provided with a gate current, it turns ON. The thyristor stays ON even without any further current in the gate until the AC voltage goes back to zero.

5 The primary object of the invention is the technique to provide power to the controller by stealing a portion of the AC power at the beginning of the half cycle and to provide the gate current pulse to enable the thyristor. During any portion of the half cycle, the controller can initiate an ON cycle by providing a gate current pulse. Once initiated, the thyristor takes over until the end of the half cycle zero crossing.

10 The controller can maintain an OFF condition by not providing the gate current pulse.

A further object of this invention is to provide a light level controller, which includes an automated fade function, which gradually fades the light intensity level from a full ON to an OFF condition.

Another object of this invention is to provide a light controller which the light
15 is turned ON and OFF at long random times from minutes to hours. This simulates that the house is lived in and deters burglars.

Another object of this invention is to provide a light controller, which has an attention-getting mode that flashes the light from full brightness to dim at a fast, periodic rate. This light controller if installed in the front porch light electrical circuit
20 would help delivery personnel locate the house.

Another object of this invention is a three-position switch where one position selects the power controller, which allows for different modes. The other two positions would be full ON and full OFF.

FIG. 8 is a schematic diagram showing an AC power control circuit in accordance with an embodiment of the present invention that uses a zero crossing detector to determine when to when to trigger the thyristor driver;

FIG. 9 is a block diagram showing an AC power control circuit in accordance with an embodiment of the present invention which incorporates a microcontroller having the capability of receiving inputs from different sensors and driving different AC loads;

FIG. 10 is a schematic showing the AC power control circuit of FIG. 9 with zero-

5 crossing detector and mode selection functions;

FIG. 11A is a graphical plot of an AC voltage waveform across the AC power control circuit of FIG. 10 when the device is OFF state;

FIG. 11B is a graphical plot of an AC voltage waveform across the AC power control circuit of FIG. 10 when the device is ON state;

10 FIG. 11C is a graphical plot of an AC voltage waveform across the AC power control circuit of FIG. 10 when the device is ON state for only half of the AC cycle;

FIG. 11D is a graphical plot of an AC voltage waveform across the AC power control circuit of FIG. 10 when the device is ON state for only a quarter of the AC cycle;

FIG. 12 is a graphical flowchart of the program of the device in FIG. 10 for

15 continuous dimming an AC light from ON to OFF over a period of time;

FIG. 13 is a graphical flowchart of the program of the device in FIG. 10 for randomly turning an AC load ON and OFF over a period of minutes and hours;

FIG. 14 is a graphical flowchart of the program of the device in FIG. 10 for flashing an AC light between ON and DIM;

20 FIG. 15 is a graphical flowchart of the program of the device in FIG. 10 for dimming the lights for period of time and then turning the lights to an OFF state;

FIG. 16 is a graphical flowchart of the program of the device in FIG. 10 for randomly turning the light to an ON state, an OFF state, and a DIM state at a high flash rate;

FIG. 17 is a graphical flowchart of the program of the device in FIG. 10 for turning the lights to an OFF state after a period of time;

- 5 FIG. 18 is a graphical flowchart of the program of the device in FIG. 10 for flashing the light to ON and OFF states, and sounding a beeper;

FIG. 19 is a graphical flowchart of the program of the device in FIG. 10 for turning the light to an ON state for period of time and then to a DIM state thereafter;

- FIG. 20 is a graphical flowchart of the program of the device in FIG. 10 for dimming
10 the light;

FIG. 21 is a block diagram showing a three-position switch combined with the AC power control circuit of FIGs 1-2;

FIG. 22 is a perspective view showing an electrical switch box with the three-position switch and AC power control circuit of FIG. 21 housed therein;

- 15 FIG. 23 is a perspective view showing an AC electrical system with the AC power control switch of FIG. 22 in series with the light; and

FIG. 24 is a perspective view showing an AC electrical system with AC power control switch of FIG. 22 with reverse connection to the AC power and AC load.

DESCRIPTION OF INVENTION

a. OVERVIEW

FIG. 1 shows a block diagram schematic of the AC power control circuit 38 in which AC power from AC source 18a and 18b is applied to load 14 under control of series power control circuit 38. The AC power control circuit 38 includes a thyristor 36, the power network 20, a thyristor driver 34, and the control circuit 30. The power network 20 provides low voltage through lines 24 and 26 continuously to operate the control circuit 30 and the necessary drive current pulse when needed by the thyristor driver 34 via lines 22 and 25. The thyristor driver 34 provides the necessary gate current pulse to turn the thyristor 36 ON.

A thyristor 36 is a semiconductor power switch that allows high current AC or DC to flow when trigger by a gate current pulse. Two types of thyristors are SCRs (Silicon-Controlled Rectifiers), and TRIACs (TRIode AC switches).

The operation, principle components, and exemplary applications for the invention are described in greater detail under the appropriate subheadings below.

b. CYCLE-STEALING

FIG. 2 shows an electrical schematic of one version of the AC power control circuit 38 illustrated in FIG. 1. Here, the control circuit uses a microcontroller 31. Each block of FIG. 1 is represented by electronic components. In this circuitry, the power network 20 provides the continuous power to the microcontroller 31 shown as a Microchip PIC 12C508A. The circuit includes R1 and C1, which minimizes the current and voltage to acceptable level. Diodes D1, D2, D3, and D4 converts AC

power to DC power. Diode D6 is a zener diode, which keeps the voltage level on lines 24 and 26 to an acceptable level for the microcontroller 31.

Capacitor C2 maintains the current to the microcontroller 31 during the times when the AC power is not provided. The thyristor driver circuitry includes resistor R2, diode D5, an optoisolator triac driver 40 shown as a Motorola MC3011, and resistor R3.

To enable the triac driver, the microcontroller 31 allows a minimum current pulse to
 5 flow through line 25. The output lines 27 and 28 of the triac driver 40 closes the path from resistor R3 to the gate of the thyristor 36. This provides a gate current pulse to the thyristor 36, which causes the thyristor to conduct and be in an ON state. Once the thyristor 36 is ON, there will be no more current flowing to the control circuitry via lines 16a, R1, and C1. The thyristor 36 stays ON until the AC voltage across
 10 terminals 16a and 16b goes to zero, which happens every half cycle.

The minimum current pulse to trigger the thyristor driver which triggers the thyristor is provided by the power network circuitry via R1, C1, the diodes D1-D4, resistor R2, and diode D5 through the output line 25 of the microcontroller 31. Resistor R1, capacitor C1 and resistor R2 limit the current to the thyristor driver 40.
 15 D5 provides a minimum level of voltage to line 24 so that the microcontroller 31 has sufficient DC power during the time when it output drives the thyristor driver 40 continuously ON. Diode D5 can be eliminated in configurations where the microcontroller monitors the zero crossings and provides the necessary gate current pulse for the minimum duration needed to trigger the thyristor or when R2 is high
 20 enough value that the current draw from C2 is minimal.

FIGS. 3A and 3B illustrate the AC waveforms appearing across lines 16a and 16b of FIG. 2 during an ON and OFF actuation. In the OFF situation, the thyristor is not provided with any gate current pulses and the voltage across lines 16a and 16b is the same as the applied waveform. During this time, there is sufficient current supply
5 for the internal circuitry whenever the voltage is above that indicated at 294. The internal voltage on lines 24 and 26 is clamped by diode D6 in FIG. 2 to provide an acceptable source of DC power for control circuitry 30.

In a fully ON situation, the thyristor is enabled when the instantaneous voltage indicated at 300 across the thyristor 36 provides enough power indicated at 304 to the
10 internal circuitry both for the microcontroller and for enabling the driver 40 to provide the gate current pulse. FIG. 3B shows the voltage across lines 16a and 16b when the thyristor is in an ON state. At the beginning of each AC half cycle, a small portion of the AC power is "stolen" and used by the internal circuitry, hence the term "cycle-stealing" as used here. When the voltage reaches a level to supply the necessary
15 current to trigger the thyristor driver and therefore the thyristor, the thyristor is turned ON providing a low impedance path for the AC current. This low impedance condition provides power to the AC load 14 through the thyristor 36.

From FIG. 1, the invention utilizes the AC power source from a wire lead 18a to control the AC load 14. The invention is connected in series with the AC power
20 source 18a and the load 14 via first and second leads, 16a and 16b.

The thyristor 36 is in series with the leads, 16a and 16b, and controls the flow of AC current to the load 14 in response to activation of the thyristor 36 by a gate current pulse. The gate current pulse is produced by the driver 34.

The driver 34 is selectively controlled by the control circuitry 30. The control circuitry 30 obtains its DC power from the power converter network 20. The power converter network 20 is coupled between first and second leads, 16a and 16b. The power converter network 20 adapts or steals a portion of the AC current at the beginning of each half cycle of the AC current and converts the AC current into a source of DC current for the control circuitry 30.

c. POWER NETWORK

Some examples of different power networks that will supply DC power to the cycle-stealing device include the following:

FIG. 4 shows a second embodiment, where the power conversion network includes resistor R1 and diode D1 instead of R1, C1, and diodes D1-D4. Here, the resistor R1 has a larger power rating to handle the current flow needed for the microcontroller 31 and thyristor driver 40. In order to minimize the current, this circuit uses a thyristor driver 40 with a more sensitive internal LED such as the Motorola MC3012. Diode D1 only provides power on every positive-going AC cycle.

FIG. 5 shows third embodiment where the electrical circuit uses a capacitor C1 and a smaller value for R1 to provide the needed power. Diode D2 is needed for allowing the AC voltage to charge and discharge capacitor C1. The DC power is derived from the AC power only on positive going AC cycles.

d. THYRISTOR DRIVER

FIG. 6 illustrates another embodiment of the device using a relay 41 such as 12 VDC reed relay, Radio-Shack No. 275-233, instead of an optoisolator driver 40 in the circuitry. D5 is not needed because R2 and the resistance of the relay coil is large enough to minimize loading of the power network.

FIG. 7 illustrates another embodiment of the device using an optoisolator driver 40 with only a higher value resistor R2. With this circuitry, the AC voltage across leads 16a and 16b will be much higher to produce the necessary drive current for the optoisolator driver 40. To minimize the drive current, a more sensitive optoisolator driver such as Motorola MC3012 would be used.

FIG. 8 illustrates another embodiment of the device using the a smaller value resistor R2 but includes another resistor R4 to detect the zero crossing of the AC voltage. The microcontroller 31 is programmed to pulse line 25 long enough to provide sufficient gate current pulse to trigger the triac T1. With this circuitry, the AC voltage across leads 16a and 16b will significant smaller than in circuit of FIG. 8. With smaller AC voltage waveform, a lower EMI (ElectroMagnetic Interference) can be achieved.

e. CONTROL CIRCUITRY

FIG. 9 shows different embodiments of the control circuitry 30 of FIG. 1.

FIG. 9 shows the microcontroller 31 with various inputs from different sensors such as

5 a motion sensor 70, temperature sensor 76, smoke detector sensor 72, burglar switch 74, mode selection switches 78, and a zero crossing detector 50.

Also, FIG. 9 shows the microcontroller 31 driving a speaker 80 or LED 82 from its outputs in addition to driving the thyristor driver 34. The AC power controller 40 can drive lights 60, resistive loads 62, and motors 64. The microcontroller can be

10 programmed to turn on the light when it detects motion in the room or turn on the heater motor when the temperature is low.

FIG. 10 shows an electrical circuit similar to FIG. 2 but with zero-crossing detector circuitry, a speaker B1 and mode selection 33, 35, and 37. The zero-crossing detector circuitry uses resistor R4 to limit the current into the microcontroller 31. The
15 microcontroller 31 contains internal diodes, which limits the AC voltage to microcontroller supply voltage line 24 and supply return line 26. Since the zero crossings are detected, the microcontroller only needs to turn on the driver for a short time to enable the gate current pulse. This allows for the elimination of diode D5.

FIGS. 11A, 11B, 11C, and 11D is a graphical plot of variable AC voltage
20 triggered at different points on the AC cycle. The device is triggered by providing the gate current pulse after detecting the zero crossing. FIG. 11A shows when the zero crossing detected at time $t(0)$. FIG. 11B illustrates the voltage across the thyristor

when the AC load is powered at time $t(1)$ and $t(2)$ after stealing a portion to power the microcontroller 31 and providing the gate current pulse. In FIG. 11B, the AC load, such as a light, would be ON. FIG. 11C illustrates that the load is not powered until time $t(2)$ and only a half cycle of power is applied to the load. If the AC load were a light, the light would dim to about half brightness. FIG. 11D shows that the load is not powered until time $t(3)$ and only a portion of the half cycle is applied to the load. In FIG. 11D, the AC load would only received portion of the AC power. The microcontroller can be programmed to provide power to the load at any time for any duration.

10 f. MICROCONTROLLER PROGRAM

FIG. 12 shows the flowchart for the program implemented in the microcontroller 31. FIG. 10 is the electrical circuitry and FIG. 11 illustrates the waveform of the operation. With the program illustrated in FIG. 12, a continuous dimming capability from 100 % to OFF condition over any time period is achieved.

15 The flowchart in FIG. 12 shows three timers. The first timer sets the time period when the light is fully ON to when the light is fully OFF such as thirty minutes. The second timer sets the time period for how long the light will be in each dimming position, such as eight seconds, for example. The third timer sets the time period from the zero crossing until the light is turned ON such as two milliseconds for one
20 dimming setting. This example of two milliseconds can be represented of the third timer at time $t(1)$ of the cycle. When the third timer is at $t(3)$ of the cycle, the AC load would only be ON for about 25% of the time. This third timer is varied over the first

timer's period from turning the light ON to full brightness to turning the light ON at the end of the full cycle is completed which is 1/60 second for a 60 Hz AC power source. Each dimming setting will be ON for the duration of second timer.

Also, the microcontroller 31 is programmable for several other functions. FIG.

5 13 shows the flowchart of a program which turns the light 60 ON and OFF randomly between time periods in minutes or hours. This simulates that the house is occupied and deters burglars from breaking into the home. FIG. 14 illustrates the program for flashing the light 60 between ON at full brightness and dim at a visually discernable rate, such as four seconds. If installed in the circuit for the porch light, this would

10 bring attention to the house so that the pizza or other delivery services could easily locate the house. FIG. 15 illustrates the program for turning the lights to dim for a period of time such as twenty minutes and then OFF. This feature would allow parents to keep the light ON low for their children until they fell asleep and then automatically turn OFF. FIG. 16 illustrates a program to randomly turn the light 60

15 ON, OFF, and DIM at a high rate in seconds. This flickering effect would provide a party-type atmosphere. FIG. 17 illustrates a program to turn the lights OFF after a pre-set period of time such as ten minutes. FIG. 18 illustrates a program to turn the lights ON and OFF at a relatively high rate, such as a second, and which sounds a beeper B1 while it is in an OFF cycle. If used on the front porch light would allow

20 emergency response personnel to locate the home more quickly and alert the occupants that the device is functioning by the sound. FIG. 19 illustrates the program for turning the light 60 on for a period of time such as twenty minutes and than dim

thereafter. This would be used on lights to save energy, but not eliminate the lighting. FIG. 20 illustrates the program where light 60 is turned ON every half cycle thereby providing a dimming function.

g. MOUNTING SCHEMES

5 Mounting the AC power controller 38 with a three-position switch 102 provides three levels of operation as shown in FIG. 21. The apparatus 100 is connected in series with the light 60 and AC power lines 18a and 18b. The three levels of operation are the ON position 80, the OFF position 82, and the MODE position 84. In the MODE position 84, the AC power controller 38 operates the light
10 in accordance with its programmed operation. FIG. 22 shows the three-position switch and the AC power controller 38 in an electrical box 110. Lines 19 and 16b connect to the light 60 and the AC power. FIG. 23 and FIG. 24 show the connections to the electrical circuit. Either line 19 or 16b can be connected to the AC load or AC power.

15 The invention may be embodied in other specific forms without departing from the spirit or essential characteristics thereof. The present embodiments are therefore to be considered in all respects as illustrative and not restrictive, the scope of the invention being indicated by the appended claims rather than the foregoing description.

1. A method for switching AC power flow through, and deriving a supply of DC power from one side of an AC power circuit, comprising the steps of:

- 5

10

2. An electrical current control apparatus for operatively interconnecting a source of AC current and an AC load comprising:

- a) a thyristor having a first and second leads coupled between said source and said AC load, where in said thyristor is connected in said first lead so as to permit flow
5 of AC current through said first lead in response to activation of said thyristor by a gate current pulse, said thyristor being configured to remain actuated after termination of said gate current pulse so long as a predetermined minimum current is flowing through said first lead;
- b) a driver for initiating said gate current pulse to said thyristor at the beginning of
10 each half cycle of said AC current, said driver for initiating said pulse being connected to said first lead in parallel with said thyristor, so that said pulse is terminated by actuation of said thyristor and the remainder of said half cycle of said AC current flows through said thyristor and said thyristor remains actuated until said AC current drops below said minimum current at the end of said half
15 cycle;
- c) power conversion means coupled between said first and second leads and effective for adapting a portion of said AC current at the beginning of each half cycle thereof into a source of DC current; and
- d) control means powered by said DC current for selectively supplying said gate
20 current pulses to said thyristor through the said driver.

3. The control apparatus of claim 2, wherein said control means comprises a programmed microcontroller.
4. The control apparatus of claim 2, wherein said power conversion means comprises means for diverting a portion of said AC current at the beginning of each cycle of
5 said AC current and converting said portion of said AC current to said DC current.
5. An apparatus for selectively energizing an AC electrical load, comprising:
 - a) a thyristor coupled between first and second AC current leads for
controlling a flow of AC line current from said thyristor to said AC
10 electrical load;
 - b) a microcontroller which is programmed to selectively provide enabling gate current pulses to said thyristor; and
 - c) a DC power supply coupled with said thyristor and effective to derive
electrical power for said microcontroller from any portion of said AC
15 current.

6. An apparatus for selectively energizing an AC electrical load, comprising:

- a) a thyristor coupled between first and second AC current leads for controlling a flow of AC line current from said thyristor to said AC electrical load;
- 5 b) a zero crossing detector for detecting zero crossings of a sinusoidal waveform of said AC line current;
- c) a microcontroller which is programmed to selectively provide a gate current pulse to said thyristor in response to detector detecting a zero crossing; and
- 10 d) a DC power supply for providing power to said microcontroller.

7. An apparatus for selectively energizing a high-voltage AC electrical load, comprising:

- a) a switch housing mountable within the interior of dwelling;
- b) a switch mounted to said housing having an "off" position, an "on" position, and a "mode" position;
- 15 c) means responsive to selection of said "off" position for interrupting flow of AC current to said load;
- d) means responsive to selection of said "on" position for completing a circuit as to provide continuous flow of current to said load; and
- 20 e) means responsive to selection of said "mode" position for selectively completing and interrupting said circuit so as to permit flow of current through said leads, so that said AC electrical load is energized and de-

10

8. The apparatus of Claim 7, wherein said microcontroller is programmed to turn said AC load ON and OFF at long, random-time intervals.
9. The apparatus of Claim 7, wherein said microcontroller is programmed to turn said AC load ON and DIM at a periodic rate.
10. The apparatus of Claim 7, wherein said microcontroller is programmed to turn said AC load ON for a predetermined interval of time and then OFF thereafter.

ABSTRACT

An AC controller which provides programmable switching of AC power flow, together with producing a source of DC power for operating the AC controller. The

5 AC controller is connected in series with only one side of the AC power source and the AC load. The AC controller utilizes a thyristor for AC power control switching. During the operation, the AC controller steals a small portion of each half-cycle of the AC power to provide DC power to the AC controller. The AC controller enables the flow of AC current by providing a gate current pulse at any predetermined time during

10 the half cycle. Once the thyristor is ON, the AC current flows through the thyristor until the AC cycle is at or near zero. To provide an OFF state, the AC controller does not provide a gate current pulse. The AC controller uses an microcontroller for the programmable capability. The AC controller can be programmed to provide a flashing light function, a time delay off mode, an automatic fade mode, a dimming

15 function, a burglar deterrent function, and a time delay dim function. With a three-position switch which can replace existing types of wall switches, three modes of operation are achieved: ON, OFF, and MODE. The mode position initiates operation of the special function of the controller.

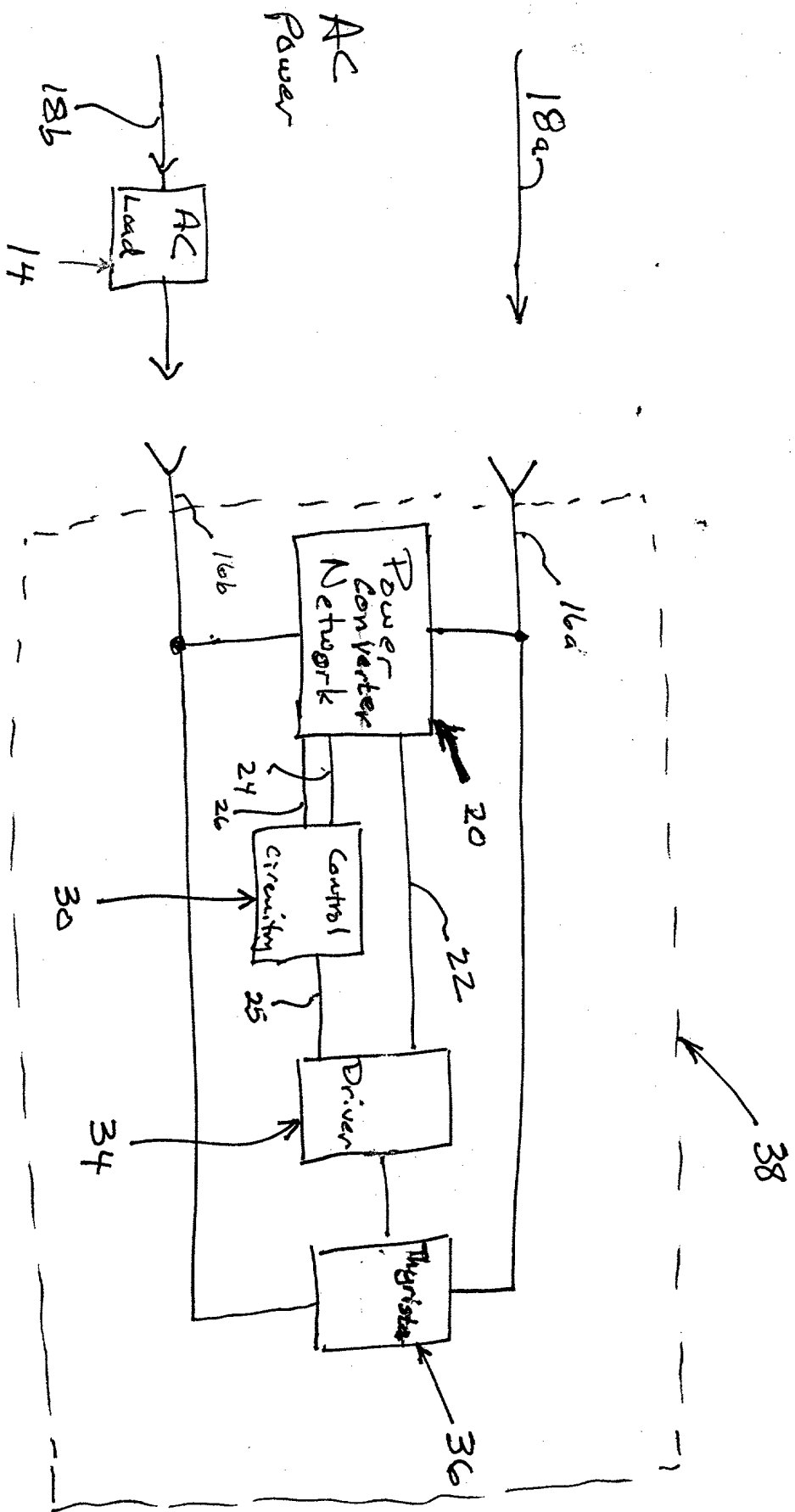


FIG. 1

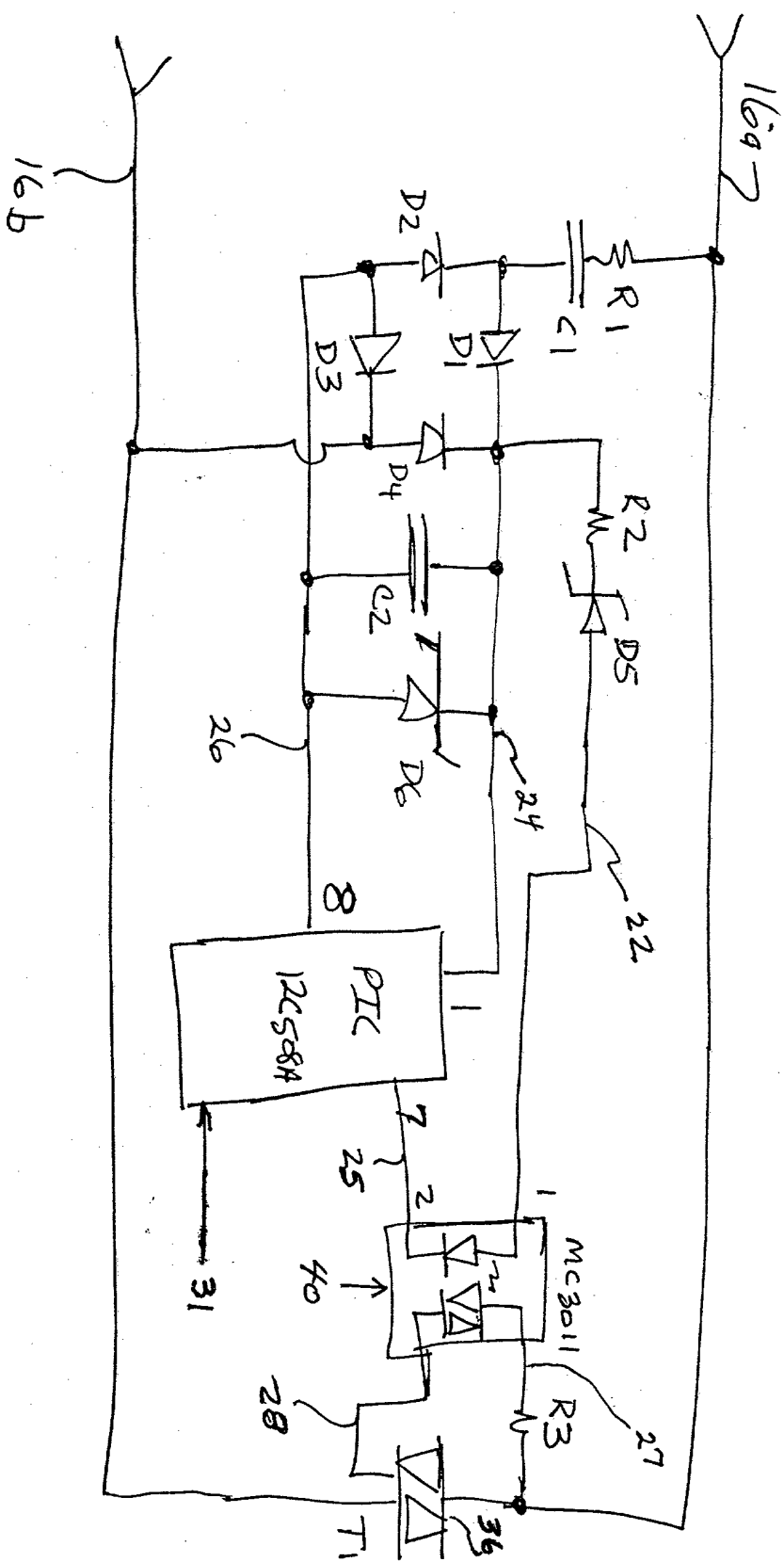


FIG. 09449375-012000

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FIG. 3A

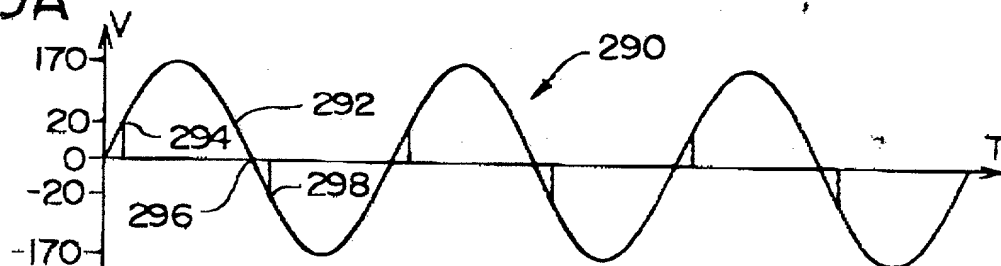
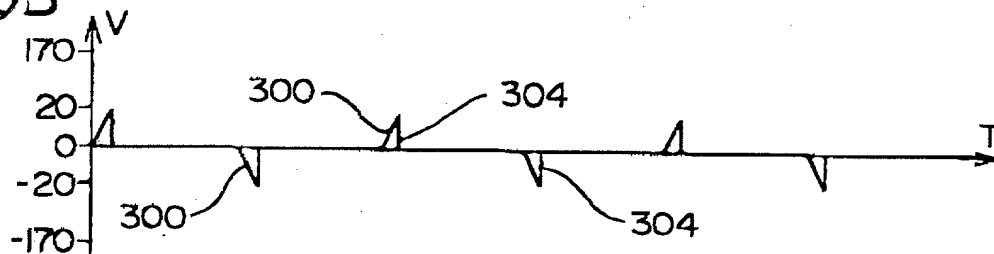
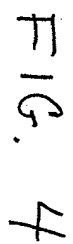


FIG. 3B



[illegible]

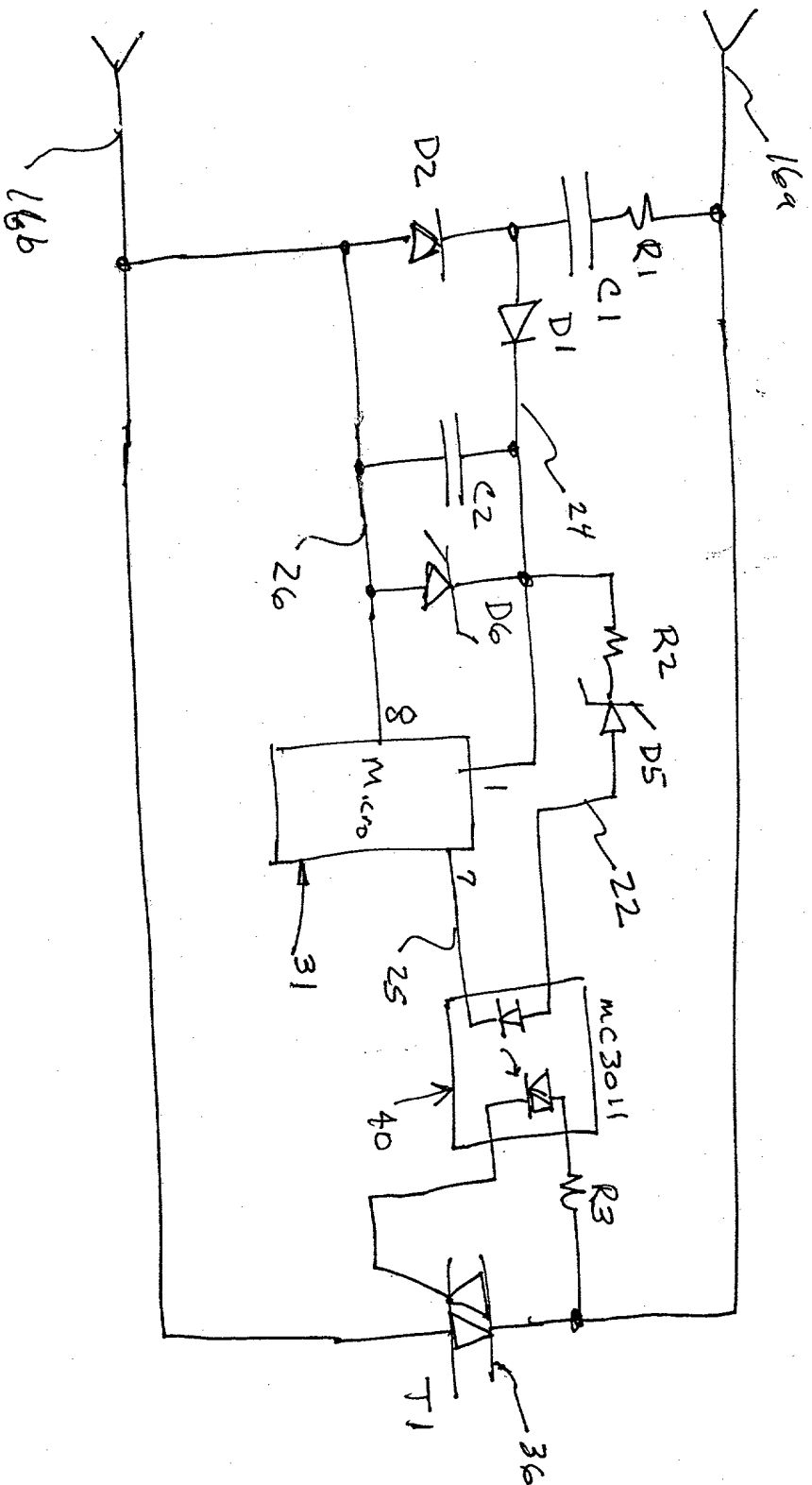


FIG. 5

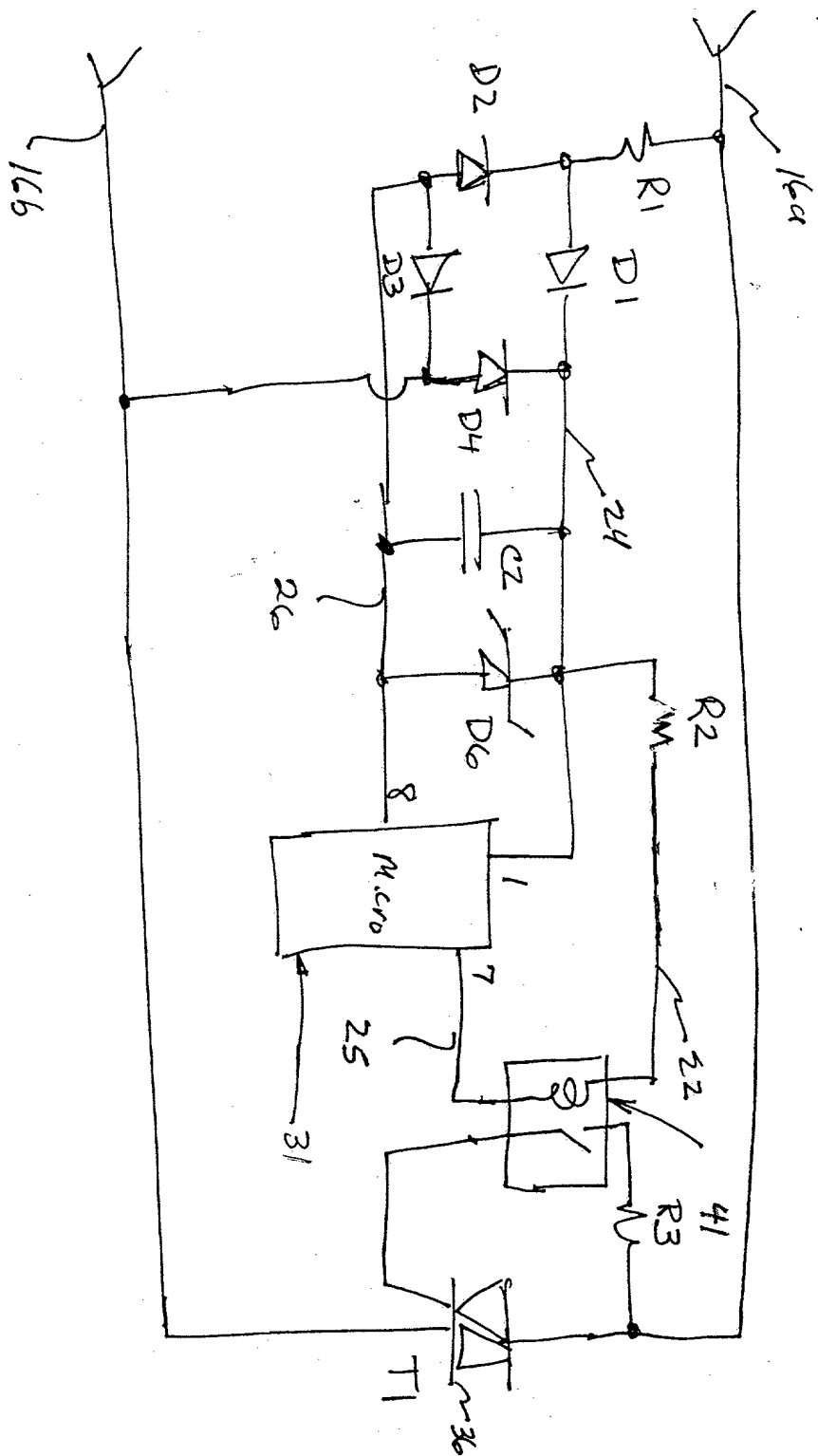


FIG. 6

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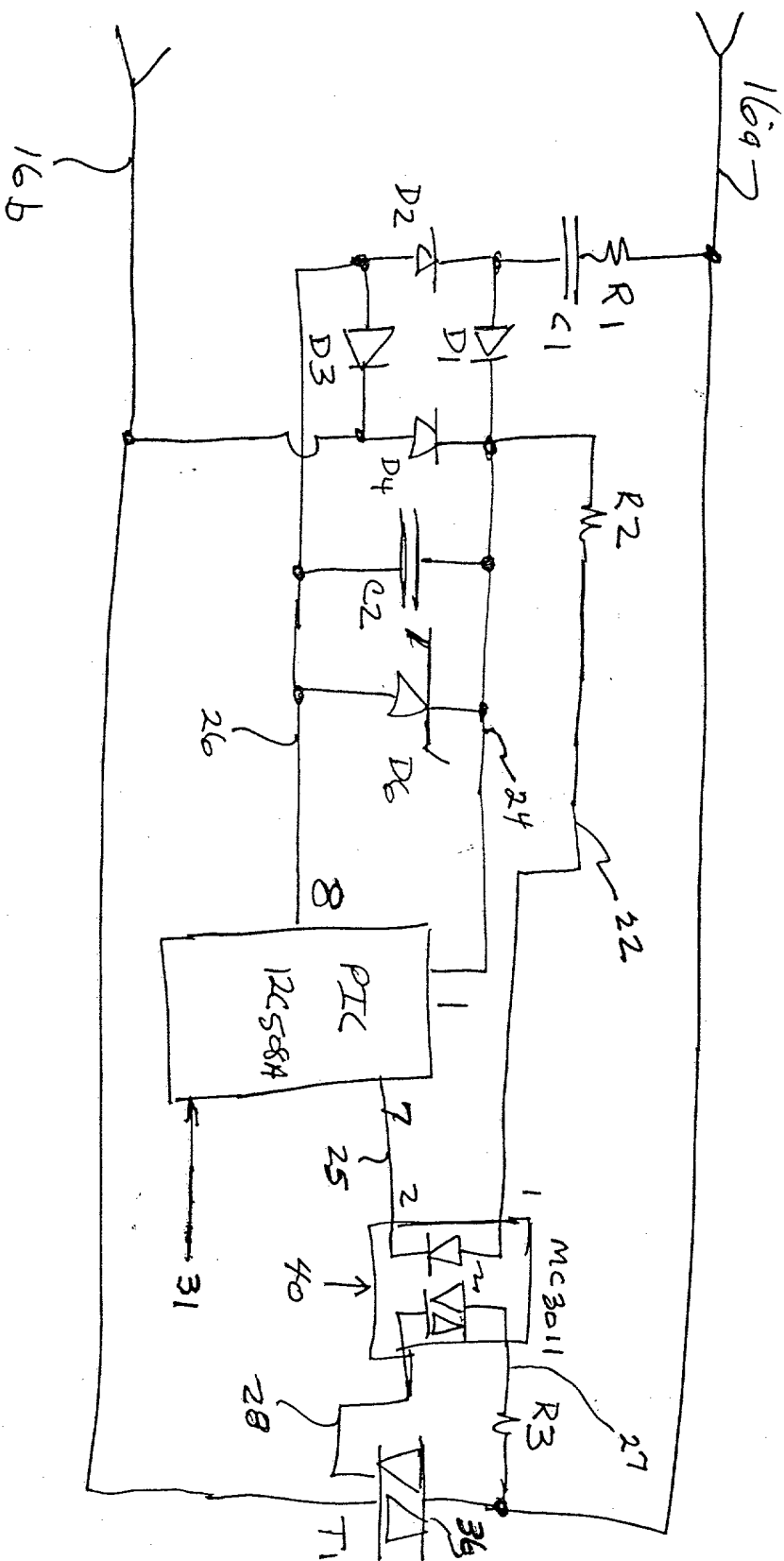


FIG. 7

094439375-012000

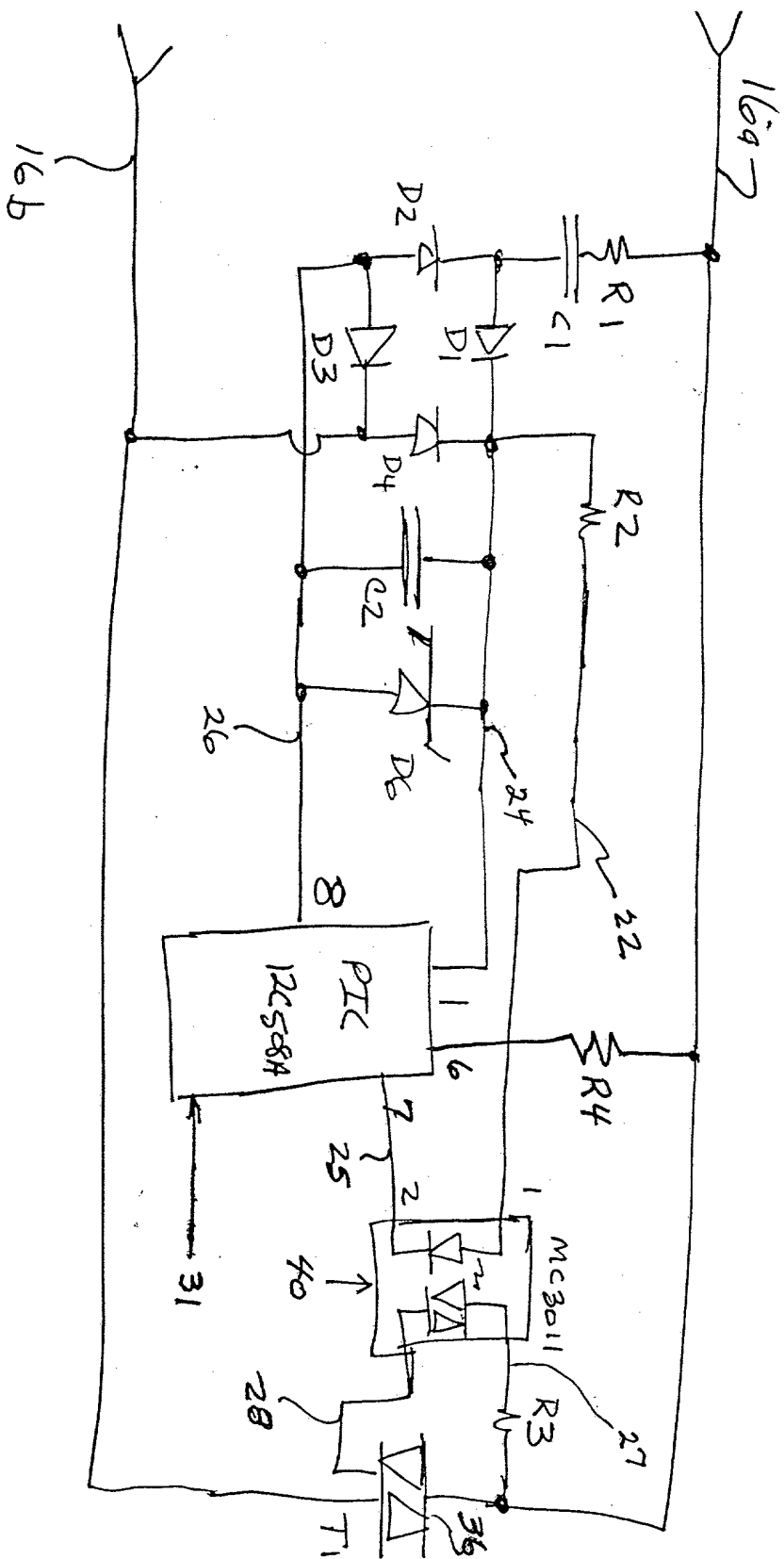


FIG. 8

094429875-012000

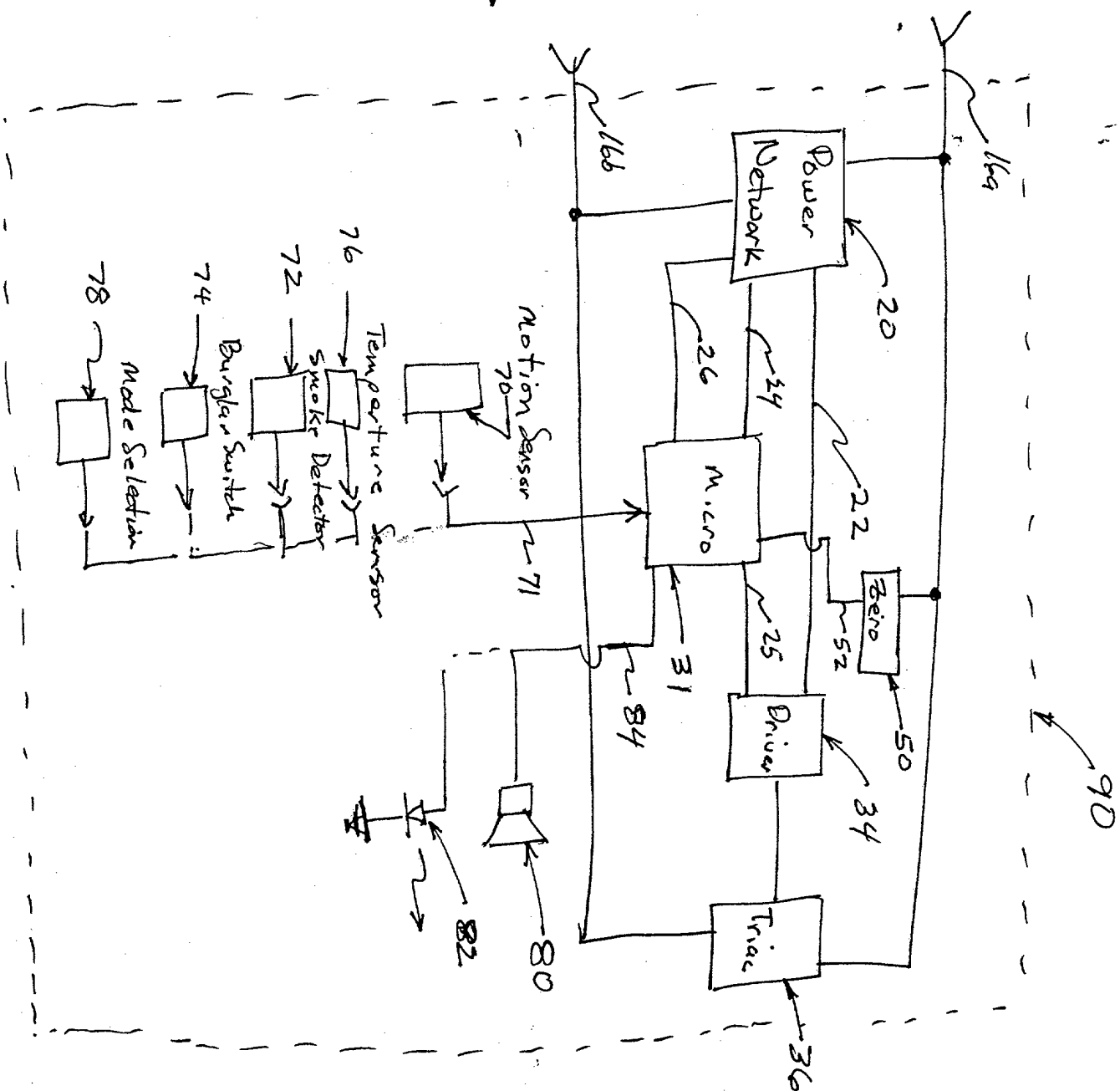
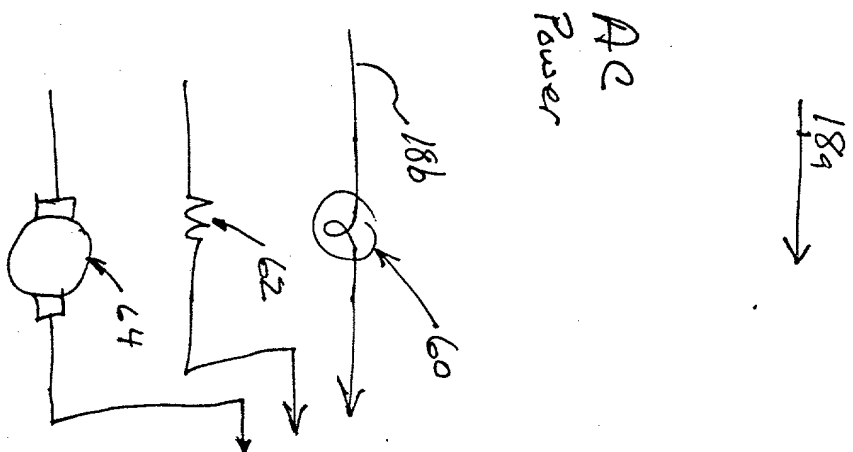


FIG. 9
094489375-012000

[illegible]

FIG. 11A

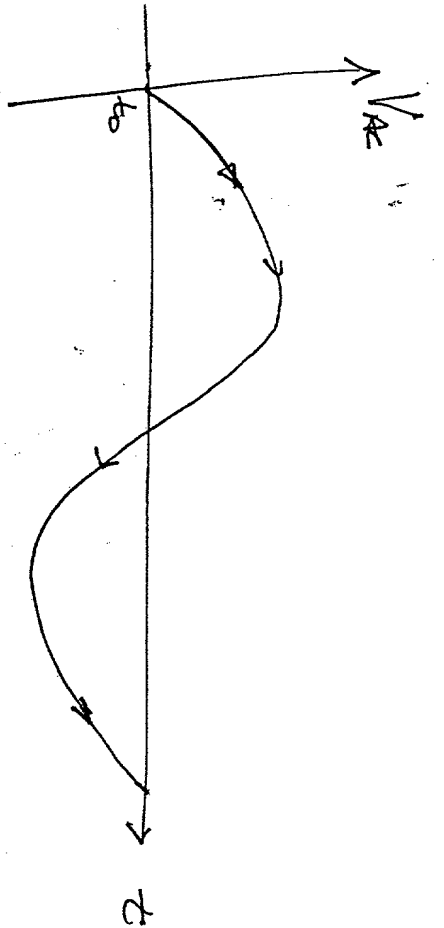


FIG. 11B

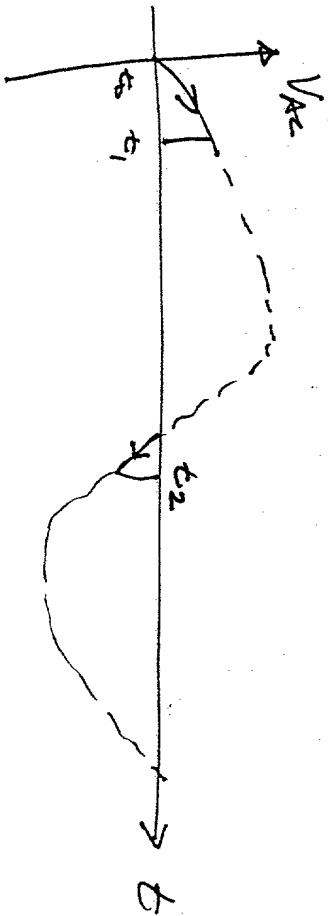


FIG. 11C

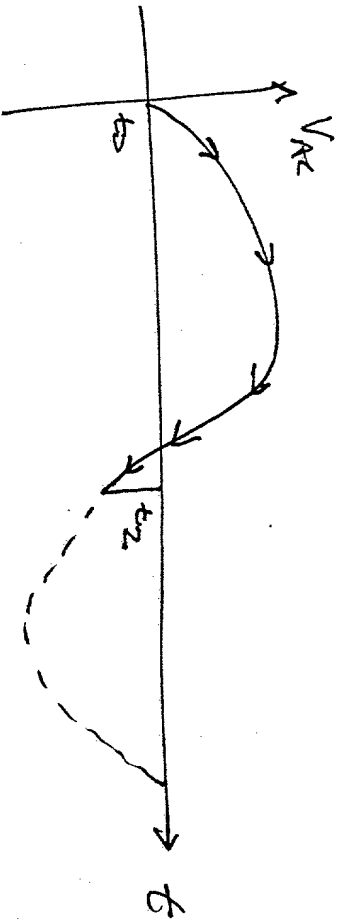
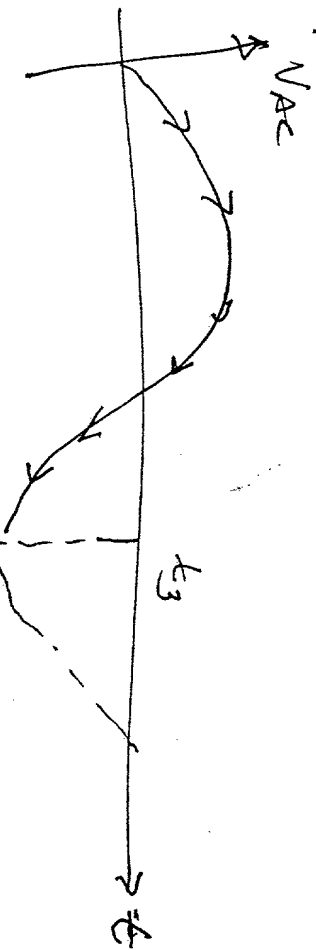


FIG. 11D



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Dim Light (100% \rightarrow 0%)

Phase Down

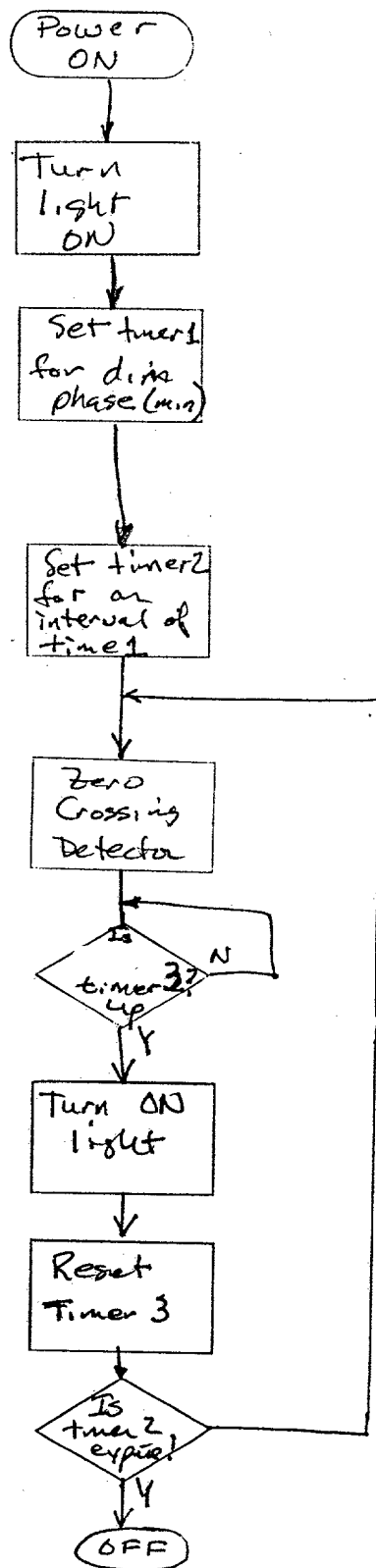


FIG. 12

FIG. 13 Burglar deterrent mode

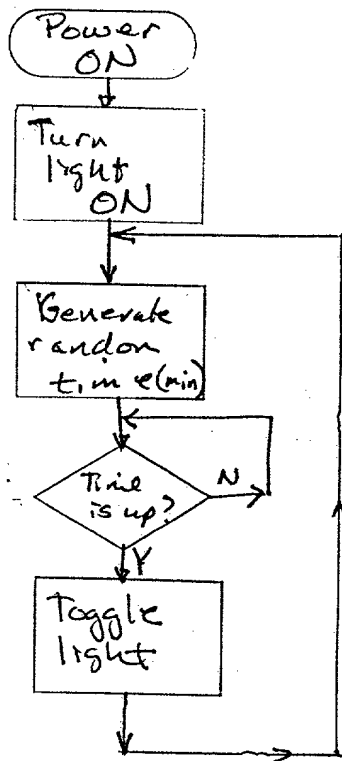


FIG. 14 Attention Mode

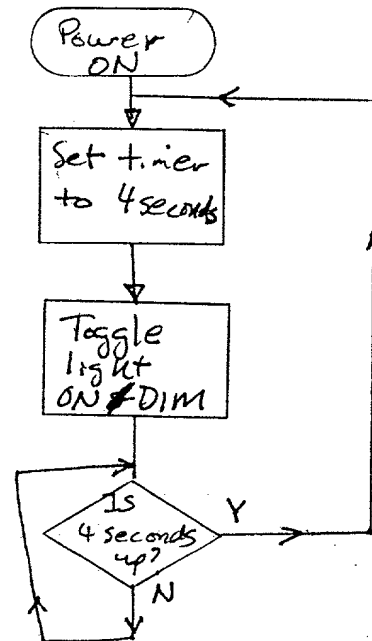


FIG. 15 Kid's Mode

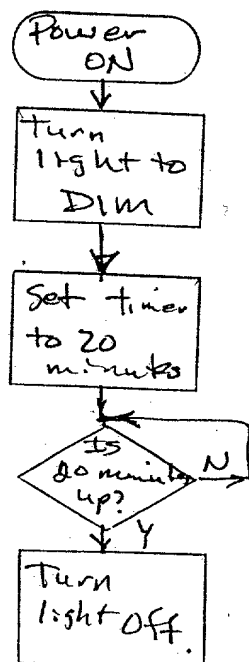


FIG. 16 Party Mode

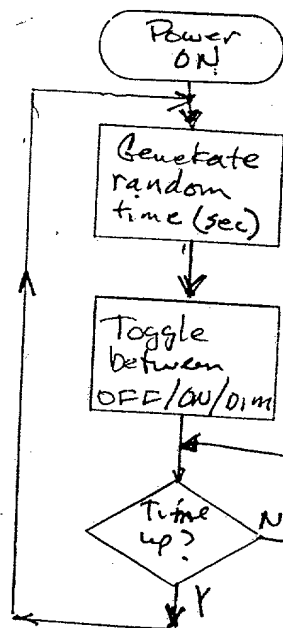
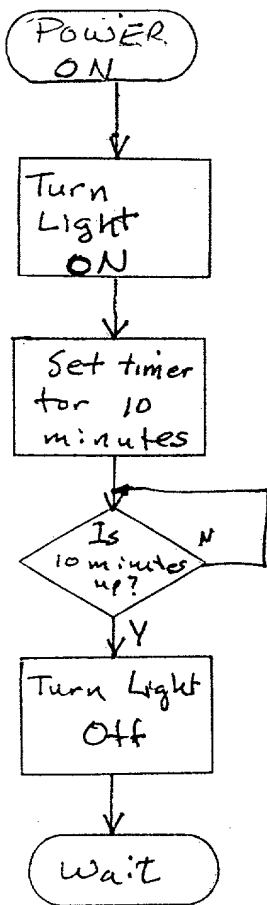


FIG. 16

FIG. 17



Time delay dim

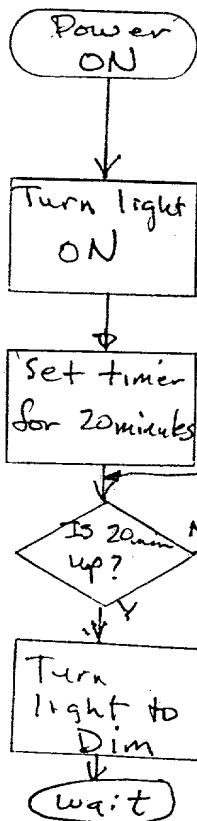


FIG. 19

Flashing Light

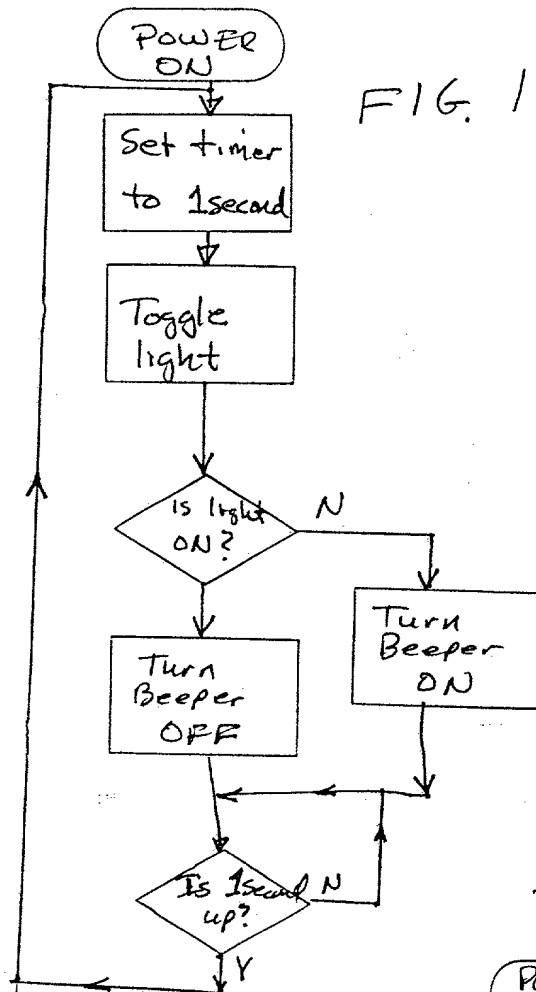


FIG. 18

Dim light

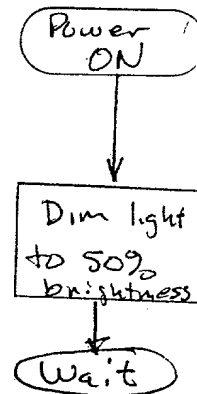
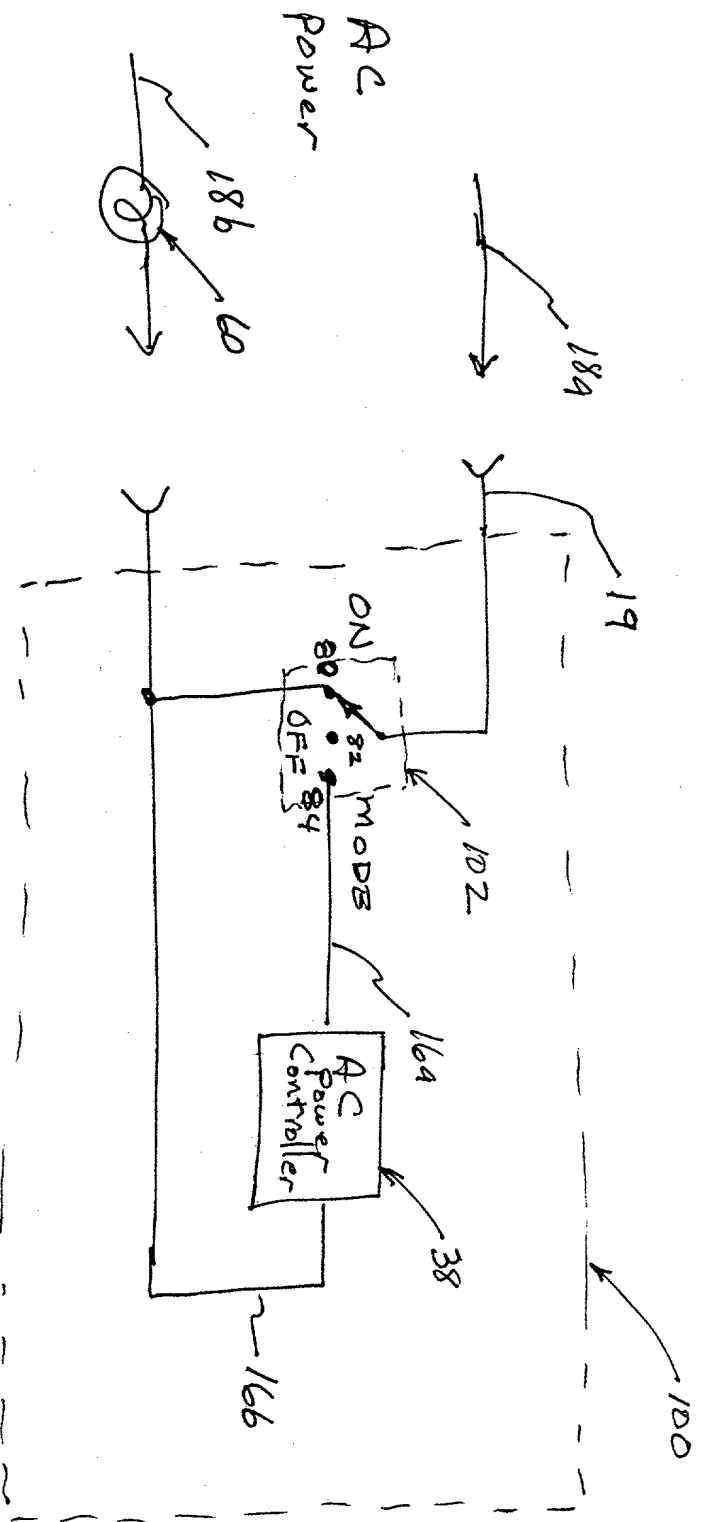


FIG. 20



F16.21

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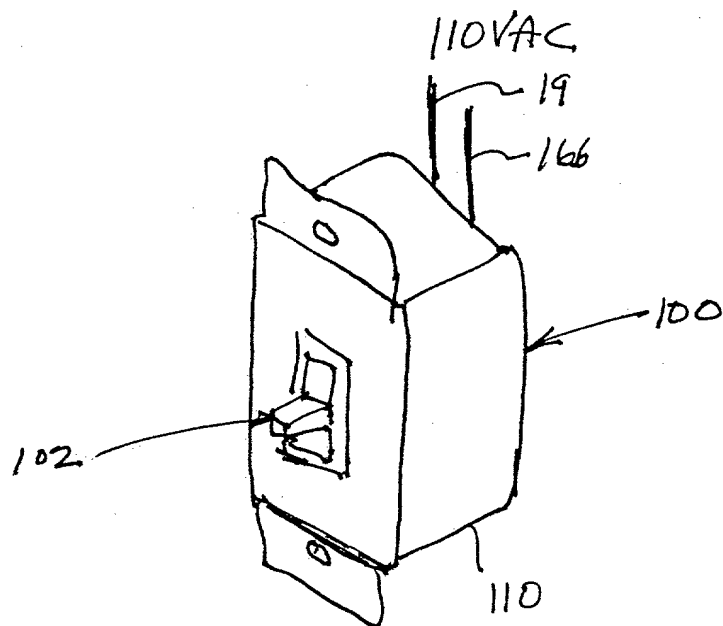


FIG. 22

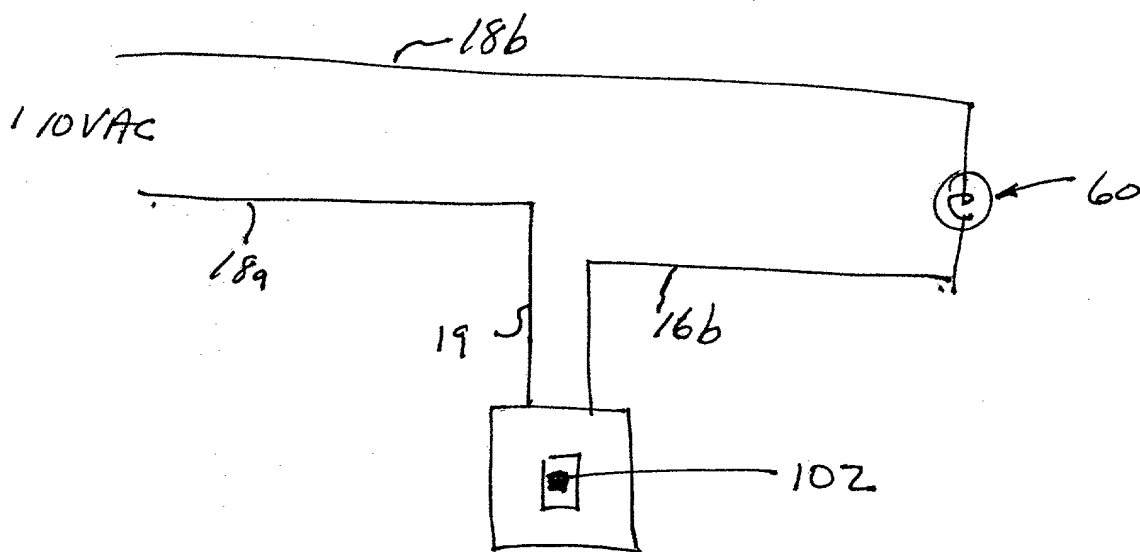


FIG. 23

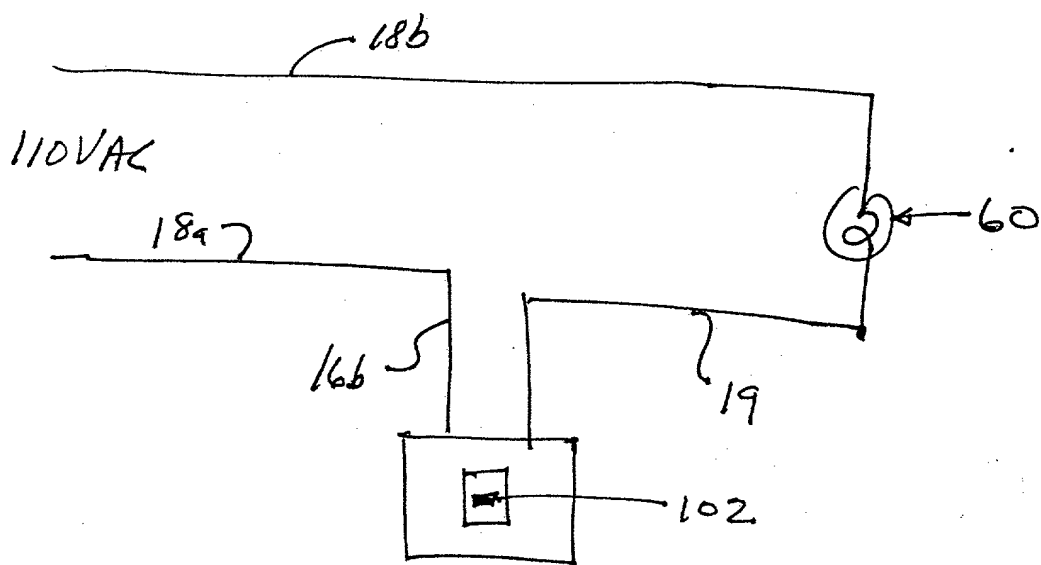


FIG. 24

Practitioner's Docket No. B1000

**ADDED PAGE TO COMBINED DECLARATION
AND POWER OF ATTORNEY FOR DIVISIONAL, CONTINUATION
OR C-I-P APPLICATION**

(complete this part only if this is a divisional, continuation or C-I-P application)

**CLAIM FOR BENEFIT OF EARLIER U.S./PCT APPLICATION(S)
UNDER 35 U.S.C. 120**

I hereby claim the benefit, under Title 35, United States Code, § 120, of any United States application(s) or PCT international application(s) designating the United States of America that is/are listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in that/those prior application(s) in the manner provided by the first paragraph of Title 35, United States Code, § 112, I acknowledge the duty to disclose information

☒ that is material to patentability as defined in 37, Code of Federal Regulations, § 1.56

(also check the following item, if desired)

☒ and that is material to the examination of this application; namely, information where there is a substantial likelihood that a reasonable examiner would consider it important in deciding whether to allow the application to issue as a patent, that occurred between the filing date of the prior application(s) and the national or PCT international filing date of this application. (37 C.F.R. § 1.63(e)).

(also check the following item, if desired)

☐ In compliance with this duty, there is attached an information disclosure statement, in accordance with 37 C.F.R. 1.98.

000000-5285460

PRIOR U.S. APPLICATIONS OR PCT INTERNATIONAL APPLICATIONS DESIGNATING THE U.S. FOR BENEFIT UNDER 35 USC 120:				
U.S. APPLICATIONS		Status (check one)		
U.S. APPLICATIONS	U.S. FILING DATE	Patented	Pending	Abandoned
1.0 ⁰⁹ , 251,233	1/16/99		X	
2.0 ⁰⁸ , 358,338	1/14/94	X		
3.0 /				
PCT APPLICATIONS DESIGNATING THE U.S.				
PCT APPLI- CATION NO.	PCT FILING DATE	U.S. APPLICATION NOS. ASSIGNED (if any)		
4. _____	_____	0 / _____		
5. _____	_____	0 / _____		
6. _____	_____	0 / _____		

(Added Page to Combined Declaration and Power of Attorney for Divisional,
Continuation or C-I-P Application (1-2.1)—page 2 of 3)

00000000-92858460

(Ref 1a—1257 Pub 605)

FORM 1-2.1

1-27

**35 USC 119 PRIORITY CLAIM, IF ANY,
FOR ABOVE LISTED U.S./PCT APPLICATIONS**

ABOVE APPLICATION NO.	DETAILS OF FOREIGN APPLICATION FROM WHICH PRIORITY CLAIMED UNDER 35 USC 119		
	Co untry and Application No.	Date of filing (day, month, year)	Date of issue (day, month, year)
1.			
2.			
3.			
4.			
5.			
6.			

(Added Page to Combined Declaration and Power of Attorney for Divisional,
Continuation or C-I-P Application [1-2.1]—page 3 of 3)

Practitioner's Docket No.

B1000

PATENT

COMBINED DECLARATION AND POWER OF ATTORNEY
(ORIGINAL, DESIGN, NATIONAL STAGE OF PCT, SUPPLEMENTAL, DIVISIONAL,
CONTINUATION, OR C-I-P)

As a below named inventor, I hereby declare that:

TYPE OF DECLARATION

This declaration is of the following type:

(check one applicable item below)

☒ original.

☐ design.

NOTE: With the exception of a supplemental oath or declaration submitted in a reissue, a supplemental oath or declaration is not treated as an amendment under 37 CFR 1.312 (Amendments after allowance). M.P.E.P. § 714.16, 7th Edition.

☐ supplemental.

NOTE: If the declaration is for an International Application being filed as a divisional, continuation or continuation-in-part application, do not check next item; check appropriate one of last three items.

☐ national stage of PCT.

NOTE: If one of the following 3 items apply, then complete and also attach ADDED PAGES FOR DIVISIONAL, CONTINUATION OR C-I-P.

NOTE: See 37 C.F.R. § 1.53(d) (continued prosecution application) for use of a prior nonprovisional application declaration in the continuation or divisional application being filed on behalf of the same or fewer of the inventors named in the prior application.

☐ divisional.

☐ continuation.

NOTE: Where an application discloses and claims subject matter not disclosed in the prior application, or a continuation or divisional application names an inventor not named in the prior application, a continuation-in-part application must be filed under 37 C.F.R. § 1.53(b) (application filing requirements — nonprovisional application).

☒ continuation-in-part (C-I-P).

INVENTORSHIP IDENTIFICATION

WARNING: If the inventors are each not the inventors of all the claims, an explanation of the facts, including the ownership of all the claims at the time the last claimed invention was made, should be submitted.

My residence, post office address and citizenship are as stated below, next to my name. I believe that I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter that is claimed, and for which a patent is sought on the invention entitled:

TITLE OF INVENTION

Microcomputer-Controlled AC Power Switch
Controller and DC Power Supply Method and Apparatus.

(Declaration and Power of Attorney [1-1]—page 1 of 7)

000000-92222260

SPECIFICATION IDENTIFICATION

the specification of which:

(complete (a), (b), or (c))

(a) ☒ is attached hereto.

NOTE: "The following combinations of information supplied in an oath or declaration filed on the application filing date with a specification are acceptable as minimums for identifying a specification and compliance with any one of the items below will be accepted as complying with the identification requirement of 37 CFR 1.63:

"(1) name of inventor(s), and reference to an attached specification which is both attached to the oath or declaration at the time of execution and submitted with the oath or declaration on filing;

"(2) name of inventor(s), and attorney docket number which was on the specification as filed; or

"(3) name of inventor(s), and title which was on the specification as filed."

Notice of July 13, 1995 (1177 O.G. 60).

(b) ☐ was filed on _____, as ☐ Serial No. 0 / _____
or ☐ _____
and was amended on _____ (if applicable).

NOTE: Amendments filed after the original papers are deposited with the PTO that contain new matter are not accorded a filing date by being referred to in the declaration. Accordingly, the amendments involved are those filed with the application papers or, in the case of a supplemental declaration, are those amendments claiming matter not encompassed in the original statement of invention or claims. See 37 C.F.R. § 1.67.

NOTE: "The following combinations of information supplied in an oath or declaration filed after the filing date are acceptable as minimums for identifying a specification and compliance with any one of the items below will be accepted as complying with the identification requirement of 37 CFR 1.63:

"(A) application number (consisting of the series code and the serial number, e.g., 08/123,456);

"(B) serial number and filing date;

"(C) attorney docket number which was on the specification as filed;

"(D) title which was on the specification as filed and reference to an attached specification which is both attached to the oath or declaration at the time of execution and submitted with the oath or declaration; or

"(E) title which was on the specification as filed and accompanied by a cover letter accurately identifying the application for which it was intended by either the application number (consisting of the series code and the serial number, e.g., 08/123,456), or serial number and filing date. Absent any statement(s) to the contrary, it will be presumed that the application filed in the PTO is the application which the inventor(s) executed by signing the oath or declaration."

M.P.E.P. § 601.01(a), 7th Ed.

(c) ☐ was described and claimed in PCT International Application No. _____, filed on _____ and as amended under PCT Article 19 on _____ (if any).

(Declaration and Power of Attorney [1-1]—page 2 of 7)

(Declaration and Power of Attorney [1-1]—page 3 of 7)

**PRIOR FOREIGN/PCT APPLICATION(S) FILED WITHIN 12 MONTHS
(6 MONTHS FOR DESIGN) PRIOR TO THIS APPLICATION
AND ANY PRIORITY CLAIMS UNDER 35 U.S.C. § 119(a)-(d)**

COUNTRY (OR INDICATE IF PCT)	APPLICATION NUMBER	DATE OF FILING (day, month, year)	PRIORITY CLAIMED UNDER 37 USC 119
			<input type="checkbox"/> YES NO <input type="checkbox"/>
			<input type="checkbox"/> YES NO <input type="checkbox"/>
			<input type="checkbox"/> YES NO <input type="checkbox"/>
			<input type="checkbox"/> YES NO <input type="checkbox"/>
			<input type="checkbox"/> YES NO <input type="checkbox"/>

CLAIM FOR BENEFIT OF PRIOR U.S. PROVISIONAL APPLICATION(S)
(34 U.S.C. § 119(e))

I hereby claim the benefit under Title 35, United States Code, § 119(e) of any United States provisional application(s) listed below:

PROVISIONAL APPLICATION NUMBER

FILING DATE

_____/_____
_____/_____
_____/_____

CLAIM FOR BENEFIT OF EARLIER US/PCT APPLICATION(S)
UNDER 35 U.S.C. § 120

- ☒ The claim for the benefit of any such applications are set forth in the attached ADDED PAGES to COMBINED DECLARATION AND POWER OF ATTORNEY FOR DIVISIONAL, CONTINUATION OR CONTINUATION-IN-PART (C-I-P) APPLICATION.

(Declaration and Power of Attorney [1-1]—page 4 of 7)

000000-9286460

DECLARATION

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

SIGNATURE(S)

NOTE: Carefully indicate the family (or last) name, as it should appear on the filing receipt and all other documents.

NOTE: Each inventor must be identified by full name, including the family name, and at least one given name without abbreviation together with any other given name or initial, and by his/her residence, post office address and country of citizenship. 37 CFR § 1.63(a)(3).

NOTE: Inventors may execute separate declarations/oaths provided each declaration/oath sets forth all the inventors. Section 1.63(a)(3) requires that a declaration/oath, inter alia, identify each inventor and prohibits the execution of separate declarations/oaths which each sets forth only the name of the executing inventor. 62 Fed. Reg. 53,131, 53,142, October 10, 1997.

Full name of sole or first inventor

Richard A. Bishel
(GIVEN NAME) (MIDDLE INITIAL OR NAME) FAMILY (OR LAST NAME)

Inventor's signature Richard A. Bishel

Date 1/20/00 Country of Citizenship US

Residence Beaverton, OREGON

Post Office Address 16020 NW Ridgetop Lane
Beaverton, OR 97006

Full name of second joint inventor, if any

(GIVEN NAME) (MIDDLE INITIAL OR NAME) FAMILY (OR LAST NAME)

Inventor's signature _____

Date _____ Country of Citizenship _____

Residence _____

Post Office Address _____

Full name of third joint inventor, if any

(GIVEN NAME) (MIDDLE INITIAL OR NAME) FAMILY (OR LAST NAME)

Inventor's signature _____

Date _____ Country of Citizenship _____

Residence _____

Post Office Address _____

(Declaration and Power of Attorney [1-1]—page 6 of 7)

(check proper box(es) for any of the following added page(s)
that form a part of this declaration)

- ☐ **Signature** for fourth and subsequent joint inventors. *Number of pages added*

• • •

- ☐ **Signature** by administrator(trix), executor(trix) or legal representative for deceased or incapacitated inventor. *Number of pages added* _____.

• • •

- ☐ **Signature** for inventor who refuses to sign or cannot be reached by person authorized under 37 CFR 1.47. *Number of pages added* _____

• • •

- ☐ Added page for **signature** by one joint inventor on behalf of deceased inventor(s) where legal representative cannot be appointed in time. (37 CFR 1.47)

• • •

- ☐ Added pages to combined declaration and power of attorney for divisional, continuation, or continuation-in-part (C-I-P) application.

- ☐ Number of pages added _____

● ● ●

- ☐ Authorization of practitioner(s) to accept and follow instructions from representative.

✶ ✶ ✶

(if no further pages form a part of this Declaration,
then end this Declaration with this page and check the following item)

- ☐ This declaration ends with this page.